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## DISEASES CAUSED BY BACTERIA AND FUNGI.

SORDELLI, A., & DEULOFEU, V. (1930). Pluralidad de antigenos contenidos en *B. anthracis*. [The Plurality of Antigens contained in *B. anthracis*].—*Revista Inst. Bacteriol. Buenos Aires.* 5. 778-785. 5 tables. [2 refs.]

The authors have shown in a previous paper that precipitins, agglutinins and other protective antibodies, developed in anti-anthrax serum as the result of immunisation by the intravenous route, are precipitated in the proteins which come out when the serum is diluted with water, but that the antibodies concerned in complement fixation remain in solution.

In the present communication, they state that a substance which possesses the power of fixing complement in the presence of the water soluble fraction of anti-anthrax serum can be extracted from *B. anthracis* cultivated upon serum agar. This substance can be extracted by water or by normal saline solution and the extraction is obtained more completely with heat than in the cold. Such extracts also contain a substance having the characters of precipitinogen. Both of these substances are relatively stable in neutral or alkaline media; the complement-fixing substance is destroyed by heat in an acid medium; both substances can be precipitated by alcohol or acetone. The precipitinogen is not thereby altered, but the complement-fixing substance loses its antigenic properties.

SORDELLI, A., & FERRARI, J. (1930). Los anticuerpos contenidos en el suero anticarbuncoso. [The Antibodies contained in anti-Anthrax Serum].—*Revista Inst. Bacteriol. Buenos Aires.* 5. 786-789. 1 table.

The authors found that agglutinins are present in anti-serum prepared by intravenous injections, but not in that prepared by subcutaneous injections, and that it is immaterial whether virulent or avirulent strains are used. Similar results were obtained with regard to precipitins.

Complement-fixing antibodies were present in larger amounts in sera prepared by subcutaneous injection than in those prepared by the intravenous method.

Both agglutinins and precipitins are contained in the fraction of serum which is insoluble in distilled water saturated with carbon dioxide.

The fraction which is soluble in distilled water saturated with carbon dioxide contains complement-fixing antigen in higher concentration than the whole serum.

BURKE, Victor, & BARNES, Laverne A. (1931). **Tissue Specificity in Anthrax Infection.—*J. Immunol.* 20. 173-177. [3 refs.]**

The authors' experiments were designed to supply an answer to BESREDKA's view that the bacillus of anthrax can only start infection in the skin and that infection does not take place if the skin is protected from injury.

A one per cent. solution of gentian violet was used as an antiseptic to prevent contamination of the skin injured by the penetration of the needle.

The bactericidal action of the dye *in vivo* was tested by injecting 0.2 to 0.3 c.c. of the solution and then introducing one M.L.D. of culture through the same puncture.

Provided that non-sporulating cultures are used, the dye affords protection if injected before the culture and it usually prevents infection if injected after the culture, but some uncertainty in this connection is explained by the fact that the dye does not reach all the organisms.

A guinea pig was inoculated subcutaneously, the culture being deposited at a point 2 inches from the site of puncture in the skin. Before the needle was withdrawn the dose of gentian violet was introduced just inside the skin aperture. Another guinea pig was inoculated in the same way, but the dye was not injected. These animals died of typical anthrax. The gelatinous oedema was present at the place where the bacilli were deposited. The dose of culture must be carefully regulated as, if too long a time elapses before death takes place, the bacteriostatic action of the dye may be reduced, in which case bacilli may be recoverable from the dye-stained tissues.

These results suggest that, if gelatinous infiltration begins at the point where infection starts, the infection does not always begin in the skin and the bacillus is not a harmless saprophyte in the subcutaneous tissue as stated by BESREDKA.

WEDEMAN, W. (1931). Kann phosphorsaurer Futterkalk, der bei der Verarbeitung milzbrand-sporenhaltigen Knochenmaterials in Gelatinefabriken gewonnen wird, noch lebensfähige Milzbranderreger enthalten? [Can Calcium Phosphate, prepared in gelatine factories from bone material containing Anthrax Spores and used for feeding stock, still harbour viable Anthrax Organisms?].—*Arch. wiss. prakt. Tierhkl.* 63. 215-229. [15 refs.]

This paper deals with the product sold in Germany as "Phosphorsaurer Futterkalk," and in English-speaking countries under names such as di-calcic phosphate or "Feeding Calcium Phosphate." It is a clean white precipitated product consisting chiefly of di-calcium phosphate, the nutritional value of which has been tested for use in the control of the diseases *lamsiekte* and *styfssiekte* (bovine aphosphorosis) in S. Africa [DU TOIT and GREEN (1930) 16th Report of the Director of Veterinary Services, Union of S. Africa, p. 267]. Its chief source is bone material used for the extraction of gelatine.

In obtaining the ossein for conversion into gelatine, the mineral matter of the bone (tricalcium phosphate) is first leached out with acid (hydrochloric or sulphuric, generally the former) and it is from this liquor that the di-calcium phosphate is obtained as bye-product, by precipitation with milk of lime. In general no suspicion has attached to this product, since the chemical process of preparation is regarded as effecting complete sterilisation [compare JACKSON, R. (1928-9) *Bull. Off. Int. Epiz.* 2. 578-582], but in the absence of direct proof the author considered it advisable to investigate the matter.

His method consisted in adding a suspension of anthrax spores to small samples of the "acid maceration brew" from a gelatine factory, taken at various stages of lixiviation, allowing to stand at laboratory temperature (17° C.) for varying periods of time and then plating out on agar to determine survival of spores. His general conclusions are:—(1) that anthrax spores exposed to maceration liquor of 5.8°-10.4° Bé for 2-8 hours are completely destroyed [degrees Beaumé contracted Bé°, being an arbitrary commercial mode of expressing specific gravity in many European countries, just as "degrees Twaddell" is an arbitrary mode of expression used for Excise purposes in England]; (2) that the di-calcium phosphate precipitated from such liquor after 3-4 hours and then dried at 50°-70° C., is free from viable spores; (3) that, on the other hand, exposure to maceration brew of 10.4°-15° Bé for 15 hours—3 days cannot be relied upon to destroy all spores, and that the phosphate precipitated from such solutions is not necessarily

free from viable spores. As the process of lixiviation with acid advances, the concentration of acid decreases and the extracted minerals of the bone of course raise the specific gravity of the macerating fluid.

The author is of opinion that this rise should not be allowed to exceed 10° Bé, and that the precipitated product should be dried at a somewhat higher temperature—at least 70°-75° C.; also that packing sacks should be sterilised and great care taken to guard against possible contamination with infected material entering the factory.

The paper also contains a useful, if incomplete, summary of the legislation in certain countries, with regard to the admission of products of animal origin, such as crude bones and bone meal.

BOQUET, A., VALTIS, J., & SAENZ, A. (1931). Sur la mécanisme de l'infection tuberculeuse expérimentale. (Première Mémoire). [On the Mechanism of Experimental Tuberculosis Infection. (First Memoir).]—*Ann. Inst. Pasteur.* **46.** 373-435. 28 tables. [49 refs.]

The authors review the results of previous workers on this subject and describe a series of experiments they carried out on guinea pigs and rabbits.

They conclude that inoculated tubercle bacilli first gain the lymphatic system, then the haemogenous circulation and that, finally, they are deposited in the viscera. The duration of this lympho-haemogenous stage is dependent on the route of inoculation and upon the number and virulence of the organisms injected. If a massive dose is given, bacillæmia supervenes within one hour after inoculation, irrespective of the path of infection, and the resulting visceral foci form sources of surinfection from which rapidly-extending local lesions develop; after medium and small doses there is a greater delay before blood dissemination occurs and the final visceral lesions are more scattered and less rapid in their spread.

So long an interval may elapse before bacillæmia occurs after the administration of minute doses by the mouth that sufficient immunity may be acquired to counteract the bacillæmic effects; in the author's opinion this may explain the occurrence of latent and occult tuberculosis in natural infections.

Certain tissues, such as lung parenchyma and serous membranes, are more suitable for the rapid dispersion of the bacilli; hence the gravity of pulmonary, pleural or peritoneal infections.

The timothy grass bacillus and dead tubercle bacilli acted in a similar manner to live, virulent, tubercle bacilli, but the infection was only transitory.

The authors, therefore, conclude that the course of infection up to the stage of bacillæmia does not depend on the pathogenicity of the bacilli inoculated, but upon their number and physico-chemical properties; when they have reached the blood stream, their ability to remain and multiply in the tissues depends upon their virulence.

REED, Guilford B., & RICE, Christine E. (1931). Studies in the Variability of Tubercle Bacilli.

1. A Rapid-growing Bovine Type.—*Canad. J. Res.* **4.** 389-398. 14 figs. 4 tables. [20 refs.]

The authors found that an avirulent bovine type of culture consisted of the R type of colony (after PETROFF's classification). On solid media and in acid fluid media this type persisted alone, but, in alkaline and bulk fluid media, rapid transfer resulted in an appreciable dissociation to R and S types; the S type thus produced, however, was unstable and was no more pathogenic than its R precursor.

SANARELLI, G., & ALESSANDRINI, A. (1931). Démonstration *in vivo* de l'ultravirüs tuberculeux.

[The *in vivo* Demonstration of the Tuberculous Ultravirüs].—*C.R. Soc. Biol. Paris.* **106.** 426-429. [2 refs.]

The authors refer to a previous publication in the same journal in which they described the method of preparing collodion sacs which are impermeable to toxins, diastases, substances in the

colloidal state and solutions of substances having very small molecules. Such sacs do not allow the escape of bacteria.

The authors also refer to experiments in which sacs containing Vallée's bovine strain of the tubercle bacillus were placed in the peritoneal cavities of guinea pigs. After the lapse of a certain length of time there was, in the case of the majority of the animals, loss of weight and condition followed by recovery within a short time. Sooner or later, however, death took place from severe cachexia after an interval ranging from 25 to 114 days.

A peritoneal exudate which tended to rapid organisation with the formation of adhesions was always present in these guinea pigs. This exudate was composed of fibrous tissue with granulomatous formations containing giant cells and epithelioid cells. No evidence of caseation was seen.

While a sero-sanguinous exudate was always present in the peritoneal cavity, it was sometimes but not always present in the pleural cavity. The spleen was greatly enlarged and showed pronounced follicular reaction. The other organs appeared to be normal. Albumen was present in the urine. There was a variable amount of enlargement of the lymphatic glands. No tubercles could be found, but a few feebly acid-fast bacteria were present. No growths were obtained on culture media.

Guinea pigs inoculated into the groin or the peritoneal cavity with ultravirus of the first passage died in 1-5 months. The lesions resembled those caused by the first passage, but little purulent centres could be found in the epiploon and minute tubercles were present, occasionally, in the liver and spleen. Typical tubercle bacilli could be found in these lesions.

Suspensions of organs of the second passage, when inoculated into guinea pigs, produced typical tuberculosis with death in 20 to 80 days.

Similar results were obtained with a fourth passage.

All attempts to obtain cultures from guinea pigs up to the fourth passage have failed save in one case in which cultures from the liver and spleen of a guinea pig of the second passage yielded typical colonies on Petroff's medium.

LEEUWEN, Avan. (1931). Tuberculose bij het Rundvee en haar Bestrijding. [The Campaign against Tuberculosis of Bovines.]—*Tijdschr. Diergeneesk.* 58. 17-32 and 65-79.

The author discusses the factors responsible for the manner in which animals react to contact with the tubercle bacillus, the danger of spread from animals with different types of lesions and the danger to human beings of products from infected animals.

CHAMBERLAIN, H. D. (1931). Avian Tuberculosis Control in Illinois.—*Vet. Med.* 26. 186-189.

The extent to which avian tuberculosis infection is controlled in Illinois consists of the systematic tuberculin testing of the poultry and pigs on a large number of the more important farms, but not on all. The testing is carried out with the active aid of veterinary practitioners and the good will of farmers had first to be gained. The information given to the farmers that pigs are easily infected from poultry, combined with an effort to induce provision merchants, packers, large hotels, etc., to buy reacting birds which had been classed as fit for consumption, has led to the gratifying co-operation of all concerned.

Eight hundred chickens can be tested per day by a skilful man, the injection being made into the lower border of the wattle. Farmers are advised to improve their poultry accommodation, to attend more closely to the hygienic conditions and to remove all reactors and all birds over 1½ years old.

Between June, 1930, and February, 1931, 190,215 fowls in 5 counties were tested and 9,350 (4.9 per cent.) reacted. Of these 7,693 (98.1 per cent.) were classed as old birds. Just over two-thirds of the reactors were passed as being fit for food.

Out of 4,906 pigs tested, 622 reacted, 595 were infected with the avian type, 17 with the bovine type and the rest (10 cases) with mixed types. These results clearly show the significance of avian tubercle bacilli for pigs.

The author refers to the results of tests carried out on pigs in other states.

WIGHT, A. E. (1931). Present Status of Coöperative Tuberculosis Eradication Campaign in the United States.—*J. Amer. Vet. Med. Ass.* **78**. 378-385.

The success of the eradication scheme is illustrated by the progressive fall in the percentage of infected cattle which has occurred since 1922. In May, 1930, the percentage was 1.7 as calculated from the biennial survey. Out of 1,521 counties, 121 had an incidence of over 7 per cent.; in the remainder it did not exceed one per cent.

The accredited herd system has been very successful and in 1929 only 3.3 per cent. of 80,000 herds contained tuberculous animals.

In New York State, according to the law, the accredited herds must be tested annually. During the previous year 228 more counties were added to the "modified accredited" areas: these have a tuberculosis incidence of less than 0.5 per cent. and 34 per cent. of all counties in the U.S. are now classified as such.

The author refers to interstate cattle traffic and to compensation paid for obligatory slaughter. Tuberculosis was found in 11.4 per cent. of all pigs slaughtered (a reduction of 3.8 per cent. since 1924) and a corresponding reduction has occurred in the number of cattle slaughtered.

Avian tuberculosis is confined to the middle west and north central states; methods are available for its control.

Although not indicated in the title, the author discusses Johne's disease. Its incidence appears to be stationary and it is present in 15 states. Control measures were instituted three years ago and affected animals are condemned. Both johnin and avian tuberculin have been used for diagnosis, but the Bureau of Animal Industry considers that neither is satisfactory.

—. (1931). Bestrijding der Runder-tuberculose. [The Control of Bovine Tuberculosis.]—*Tijdschr. Diergeneesk.* **58**. 380-391.

This unsigned article is a piece of propaganda for the control of tuberculosis by "Bang's Method."

VRIES, G. de. (1931). Een en Ander over Miliaire Tuberculose. [Regarding Miliary Tuberculosis].—*Tijdschr. Diergeneesk.* **58**. 519-527.

As the result of his investigations, the author has come to the conclusion that, up to the present, no method applicable to meat inspection has been devised for the detection of the recent distribution of tubercle bacilli through the body by way of the blood stream. The existence of recognisable lesions is an indication that the distribution of the bacilli occurred at least several days before changes became visible.

CLARENBURG, A. (1931). Over Vogeltuberculose in Nier en Milt bij het Varken. [Avian Tuberculosis of the Kidney and Spleen of the Pig].—*Tijdschr. Diergeneesk.* **58**. 345-354. 4 text figs. [6 refs.]

The author describes the macroscopical and microscopical characters of lesions encountered in the kidneys and spleen of a pig. The lesions were proved by biological and cultural tests to be caused by tubercle bacilli of the avian type.

SEYFFERS, S. M. (1931). Een Merkwaardig Geval van Tuberculose bij den Hond. [A remarkable Case of Tuberculosis in a Dog].—*Tijdschr. Diergeneesk.* **58**. 401-408. [8 refs.]

The author describes an acute case of tuberculosis in a six months old dog and discusses the histogenesis of tuberculosis lesions.

COULAUD, E. (1924). La Tuberculose par Contamination naturelle chez le Lapin (Première Mémoire). [Natural Infection of the Rabbit with Tuberculosis (First Memoir)].—*Ann. Inst. Pasteur.* **38**. 581-597. [11 refs.]

COULAUD, E. (1931). La Tuberculose par Contamination naturelle chez le Lapin (Deuxieme Memoire). [Natural Infection of the Rabbit with Tuberculosis (Second Memoir).—*Ann. Inst. Pasteur.* 46. 424-443. 4 figs. [7 refs.]

The author gives an account of a number of cases of tuberculosis in rabbits resulting directly or indirectly from contact with experimentally infected animals.

He describes two definite methods of infection :—

1. A number of the offspring of tuberculous parents were found to be affected with the disease. This was seen, not only in the first generation, but also in the second and third generations, in young animals whose parents were apparently healthy, but whose ancestors had been diseased. A case is quoted in which the author considers that he recovered the same strain of the tubercle bacillus from the descendants of rabbits which he had inoculated more than six years previously.

Contrary to the views expressed by KOCH, STRAUSS and ROTHE, the author believes that such infection usually occurs by ingestion, not by inhalation, although the primary lesions may be found in the lungs. In support of his theory he points out that, if small enough doses are administered experimentally by any route, primary lesions are found in the lungs without the development of a local lesion.

2. A number of instances are described in which healthy does were mated with tuberculous bucks. The fact that, in several cases, the period of contact was of only a few minutes duration and that the buck was found to have tuberculous testicles, indicated that infection occurred during the act of coition. One such buck covered four healthy females of which three died of pulmonary tuberculosis and the fourth showed a tuberculous kidney lesion on autopsy.

The author recognised two pathogenic forms of this naturally contracted tuberculosis. In the one form the disease was rapidly fatal, the animals showing severe lung lesions and occasionally showing kidney lesions at post-mortem examination.

The other form was of a slowly developing nature with an indefinite duration ; in this form there were no clinical symptoms and tuberculin tests yielded negative reactions ; autopsy showed discrete lesions in the lungs and, in some instances, lesions in the kidneys.

A number of lung lesions are also described which, although not recognisable as tuberculosis, showed follicles which from their histology were, in the author's opinion, of a tuberculous nature. The character of the resultant infection did not bear any relation to the virulence of the organism used.

The author concludes that rabbits, bred and reared in contact with others that have been experimentally infected, cannot be considered as free from tuberculosis, even if they do not react to the tuberculin test.

MALKANI, Moti. (1930). On the Pathogenicity of the Bacillus Calmette-Guérin.—*Tubercle.* 11. 433-445. 5 tables. [38 refs.]

The author carried out experiments on small laboratory animals to test the virulence of the BCG vaccine.

Cultures were grown on egg and Sauton media, and Proskauer and Beck's (slightly altered) synthetic fluid medium. Twenty-eight guinea pigs and 18 rabbits were inoculated. On autopsy 21 of these animals showed either no lesions or lesion at the site of inoculation only. In 18 of them, lesions were found in the glands and organs, but the important point as to whether there was any increase of virulence in the acid-fast bacilli present in the lesions was not apparently ascertained.

The fact that there was no increase in virulence in cultures grown on egg medium is, in view of recent claims, a point of considerable interest.

The author concluded that the BCG strain, although much attenuated, still shows virulence.

A. S. GRIFFITH, [See this *Bulletin* 1. 193.] states that the BCG vaccine is incapable of producing progressive tuberculosis in *rhesus* monkeys which, he points out, are the most susceptible of all mammals to infection with mammalian tubercle bacilli.

DOLFINI, G. (1931). Contributo sperimentale sul potere patogeno del Vaccino Calmette. [Experiments regarding the Pathogenicity of Calmette's Vaccine].—*Biochem. Terap. sper.* 18. 41-49. 1 plate. [29 refs.]

The author points out that there are two important aspects of the question of vaccination with BCG—the production of immunity or of increased resistance and the innocuity of the vaccine.

He reviews briefly the literature covering these two points, referring particularly to the attempts that have been made to ascertain whether, in conditions leading to general debility, the vaccine may not become pathogenic.

In his experiments, BCG suspended in olive oil was injected into guinea pigs with a view to producing pulmonary embolism and, consequently, areas of reduced resistance. Controls which received intravenous injections of the ordinary vaccine were employed.

When the animals were killed, the controls showed a small number of greyish foci in the lungs which were just visible to the naked eye; those given the vaccine in oil showed punctiform greyish-brown nodules in the lungs, but no other lesions were discoverable.

No acid-fast bacilli could be found in films from these nodules. Fragments from the lungs of the experimental animals were used for the injection of a further series of guinea pigs. The guinea pigs of the last series were kept under observation for 10 months after inoculation and remained in good health. Parts of the lungs from animals of both the original experiments were examined histologically. In the control animals, the lesions were composed of cells of the lymphocyte type with polygonal cells and an occasional giant cell. There was no necrosis or sclerosis, but what the author interpreted as commencing calcification was present. The lesions in the experimental guinea pigs were similar in structure, but granules of brownish pigment could be found in some places in large numbers. These granules gave the nodules a brownish tint to the naked eye.

The author concludes that the attenuation of the BCG bacillus is a fixed character.

GRIFFITH, A. S. (1931). **Studies of Protection against Tuberculosis. Results with BCG Vaccine in Monkeys.**—*Med. Res. Counc. Sp. Rep. Series.* No. 152. London: H.M. Stat. Office.

—. (1931). **Vaccination of Monkeys with BCG.**—*Brit. Med. J.* July 18th, p. 111.

This important report contains the results of tests carried out on monkeys (*Macacus rhesus*) with BCG vaccine.

It was undertaken with the object of confirming the work of WILBERT in French Guinea, [*Ann. Inst. Pasteur.* (1925.) 39. 641-651.]

WILBERT used 15 chimpanzees and 56 *rhesus* monkeys in his experiments and obtained excellent results; all of the controls became tuberculous and all of the vaccinated monkeys resisted the test dose.

As the result of inoculation and feeding experiments, Griffith concluded that BCG vaccine was incapable of producing progressive tuberculosis in *rhesus* monkeys which he points out are the most susceptible of all mammals to infection with mammalian tubercle bacilli.

When BCG was inoculated intratracheally or intravenously in large doses, tuberculous pneumonia was produced, but the lesions showed no tendency to extend beyond the lungs.

The opinion of such an eminent authority that the BCG vaccine is incapable of producing progressive tuberculosis in the most susceptible of mammals is of great importance.

BCG organisms remained alive for periods up to six months in the lymphatic glands of monkeys without causing tuberculous lesions and they showed no increase of virulence when inoculated subsequently into guinea pigs.

In a second series of experiments the author proved that, when the vaccine is given by the mouth, the bacilli pass through the intestinal mucosa into the blood stream and to the cervical, mesenteric and colic lymphatic glands. He suggested that in order to obtain the absorption of a sufficient quantity of the vaccine, it should be given over longer periods and in bigger doses than those recommended by CALMETTE.

It is to be noted, however, that no reference is made to the age factor; according to CALMETTE and his co-workers, age has an important bearing on the permeability of the intestinal mucosa.

Immunity experiments, divided into six series, were carried out with 47 monkeys; 29 were vaccinated, 15 served as controls and three were artificially infected.

The resistance of the vaccinated monkeys was tested either by (a) instillation of virulent bovine bacilli on to the eye; (b) contact with infected monkeys, or (c) subcutaneous inoculation of slightly attenuated bovine bacilli.

The test dose of virulent bacilli employed by GRIFFITH was 0.001 to 0.01 mg., whereas, in WILBERT's experiments, the test dose was either (a) two doses of 0.001 by mouth at an interval of 48 hours, or (b) one dose of 0.0001 mg. by subcutaneous injection. The differences in the test dose of virulent bacilli were no doubt an important contributory factor to the discrepancies between the results obtained by WILBERT and by Griffith.

Griffith was unable to confirm WILBERT's results which showed that monkeys can be completely protected against either artificial or natural infection by means of BCG vaccine either when given by the mouth or when inoculated.

Although the disease produced in some of the vaccinated monkeys was progressive in nature, it was more prolonged in its course than in the controls.

The author concluded that inoculation with BCG vaccine had failed to confer on monkeys the degree of protection against tuberculosis reported by WILBERT, but that in some instances it appeared to produce a low grade of immunity.

CALMETTE, A. (1931). Peut-on craindre que le vaccin BCG se transforme dans l'organisme en bacille tuberculeux virulent? [Is there a Danger that BCG Vaccine may become virulent in the Body of the Host?].—*Bull. Acad. Méd. Paris.* 105. 301-314. [3 refs.]

In this article Calmette reviews the experimental and clinical data which prove the innocuity of the BCG vaccine. 100 mg. can be administered to a calf by inoculation or ingestion without causing any ill effects; a guinea pig can be given up to 1 g. without developing anything more serious than slight pathological changes in the lymphatic system and these invariably clear up by the end of the third week.

BCG organisms recovered from the tissues of children and calves after long periods have always proved to be innocuous.

Calmette is of the opinion that the results obtained by PETROFF and WATSON were accidental and that their animals may have become infected from some other source.

NEUFELD, who obtained the R and S strains of BCG dissociated by PETROFF, has shown that both were contaminated by a tubercle bacillus of human origin, slightly virulent for the rabbit.

Various French workers have been unable to confirm the results of HORMAECHE, SASSANO and MEDLAR, and DREYER.

Calmette concludes that, in the face of these facts, there is no justification in depriving children of the benefits of the BCG vaccine on the grounds that the organism can recover its virulence.

SAENZ, A. (1931). Influence du Bacille de Preisz-Nocard sur le BCG inoculé en série par la voie péritonéale. [The Effect of the Preisz-Nocard Bacillus on BCG inoculated intraperitoneally in Series].—*C.R. Soc. Biol. Paris.* 106. 433-435.

It has been said that BCG may become fully virulent as the result of the presence of some other infection in the lymphatic system. The author investigated this question. Guinea pigs, previously infected with the Preisz-Nocard bacillus, were inoculated with large doses of BCG; other guinea pigs, also previously infected with the Preisz-Nocard bacillus, were inoculated with material from the lesions containing acid-fast bacilli produced in the first passage.\*

The results showed that, when BCG is injected into healthy guinea pigs, or into guinea pigs previously infected with the Preisz-Nocard bacillus, transitory lesions only are produced. When repeated, the experiments yielded the same results.

OESTBERG, H. (1931). Några fall av pyogenes-infektioner hos nöt. [Some Cases of *B. pyogenes* Infection in Cattle].—*Svensk Vet.-tidskr.* 36. 135-140 & 169-175.

The author briefly discusses the literature relating to the subject and gives an account of cases he encountered. He found that the order of incidence of lesions was:—(1) mastitis; (2) metritis; and (3) localised abscesses in various parts of the body including the lungs and, in bulls, the pre-scrotal region. Diagnosis was in all cases confirmed by the Swedish Veterinary Bacteriological

Institute at Stockholm. WALL tested the value of serological reactions for diagnostic purposes, but the results obtained were irregular.

Vaccines and serums have been extensively used for the treatment of *B. pyogenes* infection in Sweden in recent years and the demand for these products is increasing.

DAVIES, G. O. (1930). *Corynebacterium pyogenes as the Cause of Polypoid Lesions in the Reticulum of an Ox.* *J. Comp. Path. & Therap.* **43.** 147-150.

A description of a granulomatous growth in the reticulum of an ox which on macroscopical and microscopical examination was found to resemble closely an actinomycotic growth.

The author isolated *Corynebacterium pyogenes* from the lesion and gives details of its cultural characters.

JAMES, W. A., & GRAHAM, R. (1931). *Streptococcus pyogenes. Meningeal Abscess causing Paraplegia.*—*J. Amer. Vet. Med. Ass.* **79.** 94-95. 1 fig.

An account of posterior paralysis in a pig associated with a sub-pleural abscess involving the spinal meninges. A haemolytic streptococcus, spoken of by the authors as *S. pyogenes suis*, was isolated.

COLIN, & ROSSI. (1931). Contribution à l'étude de la Pyobacillose du porc. [Contribution to the Study of Pyobacillosis in the Pig.]—*Rev. gén. Méd. vét.* **40.** 137-145. [15 refs.]

The authors describe an epizootic of pyobacillosis in pigs which was characterised by abscess formation about the limbs, ears and flanks. The animals recovered, especially after evacuation of the abscesses, and no other lesions were found in the course of post-mortem examinations which were carried out. A gram-negative bacillus, definitely distinct from the *Pasteurella*, *Pyogenes suis* and *Preisz-Nocard* groups, was found in enormous numbers in the abscess pus. It was not recoverable, however, from the blood or bone-marrow and proved to be non-pathogenic for the guinea pig.

VIANELLO, G. (1931). L'attuale epizoozia di mal rossino nella pianura Padana. [The Present Outbreak of Swine Erysipelas in the Padana plain].—*Clin. Vet. Milano.* **54.** 37-46.

During recent years, there has been a spread of swine erysipelas in the Padana plain. It was practically unknown there prior to the war, but now occurs as a veritable epizootic. The author suggests that *B. murisepticus* is the cause of the condition.

LESBOURRIES, & PINCEMAN. (1931). Forme articulaire chronique du rouget du Porc. [A chronic articular Form of Swine Erysipelas.]—*Bull. Acad. vét. de France.* **4.** 157-162. 2 figs. [2 refs.]

The authors have encountered, in seven months old pigs, a chronic articular form of this disease in which the tibio-metatarsal and carpal joints, and sometimes the stifle and elbow joints, were affected. The history would appear to indicate that the pigs were attacked soon after birth, the bone and joint lesions remaining after recovery from the earlier stage of the illness. The pigs could only stand or walk with difficulty and the joints were swollen and ankylosed.

The bacillus was recovered in pure culture from the synovial fluid of affected joints, but never from the bone-marrow. No other lesions of swine erysipelas were found and the condition must be differentiated from rickets and from *Brucella abortus* and *Mycobacterium tuberculosis* infections.

WILSON, G. S. (1931). The Gaseous Requirements of *Br. abortus* (Bovine type).—*Brit. J. Exp. Path.* **12.** 88-92. [15 refs.]

The author carried out experiments in order to obtain more precise information regarding

the effects of various gases and gaseous mixtures on the growth of a bovine strain of *Br. abortus*, obtained from patients affected with undulant fever. No growth took place under anaërobic conditions, even in the presence of 5 per cent. carbon dioxide. He found that a lowered oxygen tension was not conducive to growth and that it actually retarded the multiplication of the bacilli.

Growth occurred in any carbon dioxide tension between 0.5 per cent. and 98 per cent., provided that a minimum of 0.5 per cent. of oxygen was added.

The optimum carbon dioxide requirement was found to be from 5-10 per cent.

Maximum growth was obtained in an atmosphere containing 20 per cent. of oxygen and 5-10 per cent. of carbon dioxide.

The author discusses the manner in which carbon dioxide exerts its stimulating effects on primary growths of bovine strains of *Br. abortus*; *Br. melitensis* and porcine strains of *Br. abortus* usually grow well under ordinary aërobic conditions.

He concludes that the favourable action of carbon dioxide is not attributable to any alteration in the acidity of the medium, but to its power of rapid diffusion through the intact cell-wall, thereby causing an increase in the intracellular hydrogen ion concentration.

**WILSON, G. S. (1931). The Growth of *Br. abortus* (bovine type) in Shake Tubes.—*Brit. J. Exp. Path.* 12. 152-165. 6 tables, [2 refs.]**

In 1897, STRIBOLT observed that *Br. abortus* could not be grown on the surface of a serum-agar, glycerine medium under aërobic conditions and that, in a shake tube of the same medium, it grew as a narrow band just below the surface of the medium.

He concluded from this that the organism requires a lower oxygen tension than that present in the atmosphere.

The author carried out a series of experiments with the object of determining the accuracy of STRIBOLT's interpretation of its growth behaviour.

He concluded that in such a medium there is insufficient carbon dioxide in at or immediately below the surface for the organism to grow in this situation. The carbon dioxide liberated during growth diffuses rapidly into the air of the tube. Growth does not occur low down in the medium because the oxygen which diffuses into the medium is used up by the organisms just below the surface and anaërobic conditions are thus produced below the band of growth.

**HUDDLESON, I. F., & SMITH, L. H. (1931). A critical Study of the Brucella Agglutination Reaction and Abortion Rate in a Herd of Cattle under natural Conditions.—*J. Amer. Vet. Med. Ass.* 79. 68-78. 4 tables.**

This is a record of periodical agglutination tests together with the breeding history of 541 cattle in a large herd consisting of pure-bred animals of different breeds. The record covers the period 1923-1930 and the results are set out in tabular form.

The infected cattle were separated from the healthy ones and this study illustrates the natural course of infection in a large herd in these conditions. The herd was under veterinary supervision throughout the period. No vaccinations were performed and only methods of isolation and good hygiene were employed to control the disease.

- I. HADLEY, F. B. (1931). Bang's Disease Control in Wisconsin.—*North Amer. Vet.* 12. No. 6. 21-28.
- II. JACOB, M. (1931). The Problem of Bang Abortion Disease in the South.—*J. Amer. Vet. Med. Ass.* 78. 681-690.

I. The veterinary practitioners in Wisconsin play an important part in the control of the disease as they undertake the testing of the animals and control the plan of management in the herds.

A considerable number of animals cease to react to the agglutination test after an interval of time. This may be taken advantage of in the control of the disease, since only those animals which react persistently are regarded as infected.

II. A cursory account of methods which may be applicable for the control of *Br. abortus* infection in cattle.

THOMSEN, A. (1931). **Correlation of Occupation with Serologic Reactions for *Brucella abortus*.**—*J. Infect. Dis.* **48.** 484-497. 3 tables. [7 refs.]

Samples of serum from 61 healthy persons whose occupations did not bring them into contact with cattle and from 272 persons, the majority of whom were engaged in occupations concerned with the manipulation of cattle or with milk, were examined for *Br. abortus* antibodies by the complement fixation and the agglutination tests.

No positive reactions were found in the former group, but a considerable percentage of the latter gave positive readings.

The highest percentage of positive reactions was found amongst veterinary surgeons who had been practising for at least one year; samples from 61 out of 65 reacted.

Cattle attendants, employees and owners of infected cattle gave positive reactions in 62, 20 and 39 per cent. of cases respectively. Of 25 butchers, five gave positive reactions.

From the occurrence of *Br. abortus* in milk, it might be expected that milkers would show a considerable percentage of reactors, but out of 20 milkmaids on infected farms, the serum of only one reacted. Ten milk tasters in dairies in Copenhagen were examined, but none gave a positive reaction.

It appeared, therefore, that the treatment and care of cattle infected with *Br. abortus* were primarily responsible for the reactions and that there was no proved connection between milk and the presence of a reaction.

A history of undulant fever was rarely correlated with the titre of the serum and presumably the usual species of *Br. abortus* affecting cattle is non-pathogenic for man.

MEYN, A., & WEISKE, G. (1931). Untersuchungen über den Abortusbakteriengehalt der Vorzugsmilch einer Grossstadt. [Investigations on the *Br. abortus* Content of Milk of the highest Grade in a large Town].—*Zeitschr. Fleisch- u. Milchhyg.* **41.** 277-282. [18 refs.]

Guinea pigs were found to be more suitable than mice for the demonstration of *Br. abortus* in milk. The organism was demonstrated in 28 out of 78 samples from 10 out of 16 herds. The author discusses the regulations designed to prevent infection of human milk consumers.

GWATKIN, R. (1931). ***Brucella abortus* Agglutinins in the Blood of Sows Slaughtered in Toronto.**—*Cornell. Vet.* **21.** 77-80. 2 tables. [4 refs.]

501 samples of blood taken from sows were submitted to the agglutination test. 234 samples were tested with a *Br. abortus* antigen of bovine origin: of these, three reacted at 1:50 and 46 at 1:25; in the latter, agglutination was complete in 30 cases and incomplete in 16.

267 samples were tested simultaneously with bovine and porcine antigens; of these, 45 gave reactions at 1:25 to both antigens with some variation in the behaviour of individual samples to each antigen. The remainder gave negative reactions to both antigens.

FITCH has suggested that 1:100 should be the minimum titre to be accepted as a positive reaction in pigs and that a titre of 1:50 should be considered suspicious. With this standard, only three of the above 501 samples were positive while four others were suspicious.

JOHNSON, H. W., & HUDDLESON, I. F. (1931). **Natural *Brucella* Infection in Swine.**—*J. Amer. Vet. Med. Ass.* **78.** 849-862. 6 tables. [16 refs.]

The authors point out that *Brucella* disease in swine is generally considered to be essentially an abortion disease; the data they have accumulated indicate, however, that this is not the case.

They describe an investigation carried out on an infected herd comprising 180 pigs of various ages.

In the course of examining spleens and lymphatic glands, the porcine strain was isolated from 11 out of 15 spleens and it was isolated more frequently from spleens than from lymphatic glands. It was only isolated from the udder in one instance.

The agglutination titre of some of the infected pigs at the time of slaughter is of considerable practical importance as it has a direct bearing on the lowest titre that should be accepted as an indication of infection in the routine testing of swine.

In one pig there was incomplete agglutination in a titre of 1:25, yet the organism was recovered from the spleen, liver and lymphatic glands. Two pigs showed incomplete agglutination in a dilution of 1:50 and the organism was recovered from both animals.

The work of these authors indicates that abortion is not a frequent symptom of *Brucella* infection in swine. Sterility and the delivery of stillborn pigs at farrowing are the important economic factors.

The organism was recovered in every case from the organs of 10 sows which had failed to farrow, either on account of sterility or as the result of unobserved abortions.

From the tendency of agglutinins to disappear from the blood, the authors consider that the porcine *Brucella* strain does not remain in the body of pigs for more than three to five months.

HULTÉN, O. (1931). Banginfektion hos häst. [Bang Infection in a Horse].—*Svensk Vet-tidskr.* **38.** 25-27.

Describes a case of fistulous withers in a farm horse from which pus and blood obtained at the time of operation were sent for diagnosis to the Swedish Veterinary Bacteriological Institute. *Br. abortus* was found in pure culture in the pus from the withers and the blood gave a positive serological reaction in a titre of 1:200. Infection had evidently passed to the horse from cattle on the same farm which had been badly affected with contagious abortion in the previous years.

BIELY, J., SAWYER, C. E., HAMILTON, C. M., JOHNSON, W. T., & DICKINSON, E. M. (1931). Accuracy of Three Co-operating Laboratories in detecting Pullorum Disease by the Agglutination Test.—*J. Amer. Vet. Med. Ass.* **79.** 19-36. 7 tables, 2 figs. [24 refs.]

In order to study the reliability of the agglutination test for bacillary white diarrhoea, three laboratories carried out a combined test. Each laboratory obtained 15 positively and 15 negatively reacting fowls and took triplicate samples of their blood for four months at intervals of four weeks. The three samples were in each instance distributed among the three laboratories and the blood was tested by their respective customary methods with an antigen prepared from a common culture source. In addition, *post-mortem* examinations were carried out and attempts were made to cultivate *B. pullorum* from each case.

The results obtained by the different laboratories are illustrated by tables and show that a high degree of uniformity was attained. The only differences in diagnosis concerned eight doubtful cases and in no case did one laboratory declare a sample positive which had been found to be negative by another, or *vice versa*. *B. pullorum* was isolated from 44 out of 46 fowls found positive by each laboratory and all 46 fowls showed typical lesions of the disease. All the negative reactors were found to be free from disease at autopsy.

The technique used at each laboratory is described and illustrated in tabular form.

KESTER, W. O. (1931). Pullorum Test the Practitioners Test.—*Vet. Med.* **26.** 218-220. [8 refs.]

The author considers that for all practical purposes the "pullorin" test is superior to the agglutination test for the diagnosis of pullorum disease in fowls. The birds are handled less, reactors are less likely to be overlooked, less equipment is necessary and the work is all done by the veterinarian.

The author considers that it is nearly, if not quite, as accurate as the agglutination test, provided that it is properly carried out and that good "pullorin" is used. [This is in disagreement with most workers on the subject.]

GABRIEL, R. F. (1931). Quelques données sur la diarrhée blanche Bacillaire des volailles. [Some Remarks on Bacillary White Diarrhoea of Fowls].—*Rev. Path. comp.* 31. 432-442.

The author writes from the Quebec Veterinary College and describes this disease as the worst scourge of poultry farming in Canada. He gives a general account of the disease, its diagnosis, prevention and eradication. He prefers the slow macroscopic agglutination method for the detection of "carriers" and uses alkalinised antigen.

UBERTINI, Bruno. (1931). La diarrea bianca bacillare dei pulcini in Italia. [Bacillary White Diarrhoea of Poultry in Italy].—*Clin. Vet. Milano.* 5. 4-13. 1 table.

The author describes three outbreaks of bacillary white diarrhoea encountered in the Province of Brescia during the spring of 1930. An organism was recovered which corresponded serologically and biologically with *B. pullorum*.

PACHECO, G. (1931). Nouvelle espèce de *Salmonella* pathogènes. Differenciation avec l'espèce de Nocard. [A New Species of Pathogenic *Salmonella*. Differentiation from Nocard's Species].—*C.R. Soc. Biol. Paris.* 106. 1018-1019.

The author isolated an organism from parrots, which he has named *S. nocardii*; it is not identical with *S. psittacosis* of Nocard.

*S. psittacosis* is motile and forms acid and gas from rhamnose, dulcite and xylose, but it does not form indol. *S. nocardii* is non-motile; it forms indol and does not attack rhamnose, dulcite or xylose. Serologically, *S. psittacosis* is related to the homologous serum and to those specific for *S. aertrycke*, *S. schottmüller* and *S. suis*, but *S. nocardii* shows no such relationships.

Both *S. nocardii* and *S. psittacosis* are pathogenic for parrots; the disease caused by *S. psittacosis* is acute and fatal, that caused by *S. nocardii* is chronic and the mortality is variable.

CLARENBURG, A. (1931). Spontane Pasteurellosis bij Muizen. [Spontaneous Pasteurellosis in Mice].—*Tijdschr. Diergeneesk.* 58. 473-477.

The author describes an outbreak of pasteurellosis in the stock of white mice at the Central Laboratory of the Public Health Institute, [? Utrecht]. The period of incubation appeared to be a matter of a few days; the lesions were typical of a septicæmia. Mice and rabbits could be infected experimentally, but rats, guinea pigs, pigeons and fowls were resistant.

The insusceptibility of birds was emphasised by the fact that a vaccine prepared from the organism failed to protect pigeons against infection with the fowl cholera bacillus.

UBERTINI, Bruno. (1931). La Setticemia diplo-streptococcica dei suinetti. [Diplo-streptococcic Septicaemia of young Pigs].—*Clin. Vet. Milano.* 54. 344-356. 2 tables.

The author describes the results of investigations he carried out in three outbreaks of acute streptococcic septicaemia in young pigs.

The symptoms developed within a few hours after infection which was characterised by muscular tremors, loss of coöordination, hurried respiration and the appearance of a red rash on the skin of the abdomen and ears. Death took place within 48 hours.

On *post-mortem* examination, the subcutaneous tissue was found to be saturated with a serous exudate; there was a sero-fibrinous peritonitis; the tissues showed haemorrhages and there was slight enlargement of the spleen. Microscopical examination revealed the presence of a gram-positive, encapsulated micrococcus. In artificial cultures, many of the cocci showed a "candle-flame" shape.

The author tabulates the biochemical reactions of this organism and compares them with the reactions of streptococci and micrococci isolated from other species of animals.

Intraperitoneal inoculation of guinea pigs with cultures and suspensions of organs failed to cause infection.

The author concludes that the organism resembles that recovered from cases of what he calls "gummy spleen" in calves.

SORDELLI, A., FERRARI, José, & PRADO, M. (1930). Sobre la "Hemoglobinuria de los bovinos." (Primera Memoria). [Haemoglobinuria in Bovines. (First Memoir).]—Revista Inst. Bacteriol. Buenos Aires. 5. 797-817. 5 tables. 20 figs.

A form of hæmoglobinuria in cattle known as "Meada de Sangre" occurs in Chile.

The authors isolated a bacillus from necrotic foci in the livers of two bovines which had died from the disease and they believe it to be responsible for the condition. They classify it provisionally as a variety of *B. welchii*.

The organism is described as a large, sporulating, anaërobic, gram-positive, non-motile bacillus with rounded ends; spores are subterminal or occasionally central; optimum growth takes place in media at pH 6; growth is slow below 32° C. Sporulation does not take place in media containing liver extract, but it occurs readily in Tarozzi and Hibler media. Gelatin is liquefied and casein is digested without previous coagulation. Red blood corpuscles are hæmolyzed and nitrates are reduced to nitrites, but there is no indol production.

Reduction with the production of acid and gas occurs with glucose, lactulose, mannose, maltose and inosite. The action on glycerine was doubtful. There is no action in sorbite, arabite, dulcite, mannate, xylose, arabinose, rhamnose, galactose, saccharose, lactose, raffinose, inulin, glycogen, salicin or amygdalin.

The authors believe that the bacillus is quite distinct from *C. haemolyticus bovis* of VAWTER and RECORDS.

SORDELLI, A., & FERRARI, J. (1930). Sobre la "Hemoglobinuria de los bovinos." Poder patogénico de *Bacillus* sp. (Segunda Memoria). [Haemoglobinuria of Bovines. The Pathogenicity of the Bacillus. (Second Memoir).]—Revista Inst. Bacteriol. Buenos Aires. 5. 818-835. 12 tables.

The authors found that cultures of two strains of the organism in Tarozzi medium containing glucose proved fatal to guinea pigs in 20 to 40 hours by intramuscular inoculation. They found that the lesions produced by the two strains were identical, but that, while in some of the guinea pigs the bacilli present in the lesions had not sporulated, in others sporulation had taken place.

The intramuscular inoculation of bovines produced a hot painful swelling and evidence of systemic disturbance with a fall in the number of red corpuscles. Bacilli were recovered in culture from the local lesion, but the spleen, liver and blood appeared to be sterile.

In one experiment, necrotic centres identical with those found in natural cases were present in the liver.

Experiments showed that toxic substances were produced in cultures. The amount of toxin reached its maximum after 24 hours cultivation and there was a definite reduction in the amount at 48 hours.

Filtration of fluid expressed from the local lesion of an experimental case showed that toxin was present. Mice, rats, guinea pigs, rabbits and pigeons were found to be susceptible to the toxin by intravenous injection.

SORDELLI, A., SUÁREZ, E., & FERRARI, J. (1930). Sobre "Hemoglobinuria de los Bovinos." La hemotoxina producida por *Bacillus* sp. (Tercera Memoria). [Hæmoglobinuria of Bovines. The Hæmotoxin produced by the Bacillus. (Third Memoir).]—Revista Inst. Bacteriol. Buenos Aires. 5. 836-844.

Tabular statements show the effects of mixing varying doses of the toxin with 10 per cent. suspensions of red corpuscles from different species of animals.

The authors found that the corpuscles used could be divided into two groups:—(1) those which became hæmolyzed and (2) those which showed hæmagglutination and hæmolysis. The

first group comprised the corpuscles taken from sheep, cows, mice, dogs, horses, pigeons and goats, and the second those from rabbits, guinea pigs, rats and men.

VAWTER, L. R., & RECORDS, E. (1931). **Serologic Study of Sixteen Strains of *Bacillus hemolyticus*.**—*J. Infect. Dis.* **48.** 581-587. [11 refs.]

This paper, from the Department of Veterinary Science of the Nevada Agricultural Experiment Station, concerns the organism which the authors consider to be the cause of haemoglobinuria of cattle. Sixteen strains were compared serologically and all but one were found to be similar; no agglutination occurred between this and antiserums of the other strains. There was no serological connection between *B. hemolyticus* and either of the three anaerobes, *B. chauvoei*, *B. welchii* and *B. sordellii*.

RECORDS, E., & HUBER, Martha. (1931). ***B. hemolyticus* Infection in a Hog.**—*J. Amer. Vet. Med. Ass.* **78.** 863-865. [2 refs.]

*B. hemolyticus*, the cause of bacillary haemoglobinuria in cattle, has been found to be pathogenic for sheep. This note places on record the first account of infection in the porcine species. A pig was found dead and the *post-mortem* appearances were almost exactly like those of the bovine haemoglobinuria; *B. hemolyticus* was cultivated from the liver and the identity of the organism was further confirmed by cross-agglutination tests.

The authors make the suggestion that *B. hemolyticus* may be pathogenic for other animals and for man.

BENNETTS, H. W. (1931). **Specific Putrefaction of Hen Eggs due to *Serratia* sp.**—*Austral. Vet. J.* **7.** 27-30.

Describes a condition observed in eggs which became putrid soon after collection. Affected eggs had a peculiar odour, distinct from that of carbon disulphide; it passed through the intact shell so that the presence of affected eggs could be detected by the smell.

On holding the eggs up to the light, dark veins could be seen: these increased in area as the condition developed. On opening an affected egg, the albumen was seen to be of a dirty grey colour and the yolk greenish-yellow. There was a pink deposit on the membranes. Abundant growths of a gram-negative cocco-bacillus were obtained aerobically on surface culture media and the organism caused the characteristic changes when injected into normal eggs, but experiments failed to demonstrate its capacity to penetrate the intact shell.

An account of the biology and cultural characters is given and the author concludes it is a species of *Serratia*. Infection is evidently passed to the egg by the hen, but there has not been any opportunity to investigate this aspect of the question.

STABLEFORTH, A. W. (1931). **On the Epizootiology of Bovine Mastitis of Streptococcal Origin.**—*Vet. Rec.* **11.** 393-398.

[NOTE: A paper presented to the Dumfries and Galloway Division, N.V.M.A. Gt. Britain, at Dumfries, on December 9th, 1930.]

Knowledge on the mode of infection of the udder is still far from complete. Under research conditions, artificial infection has only been produced by means of the intramammary injection of virulent streptococci *via* the teat canal. The mechanism of infection in virgin heifers is not understood.

In the course of repeated examinations of the milk of 20 cows, the author found a constant bacterial content in many cases, although there were no visible clinical signs of mastitis. Streptococci or staphylococci are apparently present in all udders and the incidence of active mastitis depends upon factors which upset the resistance of the mammary tissue. The occurrence of the

disease in a dairy herd can be reduced by the removal of infected animals and streptococci can often be eliminated by thorough milking.

In a discussion which followed this paper, it was suggested that latent mastitis may be a sequel of an earlier infection in calfhood, that bacteria which previously caused navel-ill may be left in various parts of the body including the udder where, under favourable conditions, they may multiply and cause the disease.

Reference was also made to infection of the udder from mastitis and, in support of this theory, it was stated that the udders of cows which had retained the placenta had been preserved from mastitis by antiseptic treatment of the teats.

Several members reported favourably on the application of tar to the teats of dry cows as a preventive treatment.

There was some difference of opinion as to the value of vaccination.

MINETT, F. C., STABLEFORTH, A. W. & EDWARDS, S. J. (1930). **Studies on Bovine Mastitis. III. The Diagnosis of Streptococcus Mastitis.**—*J. Comp. Path. & Therap.* **43.** 163-187. 3 tables, 1 fig. 1 chart. [22 refs.]

The diagnosis of streptococcal mastitis is dealt with under four general headings:—(a) cultural examination, (b) microscopical examination, (c) estimation of deposit and (d) estimation of the reaction of the milk. The factors obtained under these headings are correlated.

The authors find that it is not necessary to take any elaborate precautions to cleanse the outside of the udder and teats when taking samples; it is sufficient to wipe them over carefully with a damp cloth. The first few jets of milk should be rejected, but the samples should be collected from the fore-milk, as streptococci tend to be present in this portion in larger numbers than in the remainder of the milking. In chronic cases the number of living streptococci in the milk may vary enormously and, in those cases in which the character of the secretion is profoundly altered, it may not be possible to obtain cultures although microscopical examination may shew that the organisms are present in very large numbers.

The authors find that plating on blood agar is the most reliable method of cultural examination. As compared with cultural examination, microscopical examination of the milk sediment is likely to fail as a means of diagnosis in about fifty per cent. of cases.

Microscopical examination of smears of gravity cream is of some value for the purposes of diagnosis, but border line cases are frequently encountered.

The authors consider that the normal amount of sediment obtainable from the fore-milk of healthy cows in full lactation, after centrifugation for a definite period at a known speed, is 0.1 per cent. (1 part per 1,000); this figure, however, does not hold good if there is any departure from the conditions laid down. A great excess of sediment is not a constant feature of streptococcal mastitis. Out of the large series of samples (several hundred), examined by the authors, more than half of those from infected udders yielded not more than 0.25 per cent. of sediment.

While the reaction test has some value when the reaction is definitely abnormal, it is not a reliable guide to the presence of streptococcal infection. Marked alkalinity of the fore-milk of cows in full lactation is evidence of disease, but a normal reaction of the milk is not an indication of a healthy udder. In a large proportion of definite cases of infection, the change in the reaction of the milk may be very slight.

While there is a relationship between the amount of sediment obtainable by centrifugation and the degree of alteration in the reaction of the milk, neither of these tests appears to bear any direct relationship to the number of streptococci that can be obtained by cultivation tests.

In testing the milk from a herd of cows, valuable preliminary tests of infected animals can be made by the bacteriological examination of mixed samples from the four quarters of each cow.

ERNESTI, S. & WAURICK, K. (1930). Beobachtungen über Streptokokkenmastitis (gelber galt) an der Kuh Nr. 84 des Bestandes G. in K. [Observations on Streptococcal Mastitis (yellow galt) in Cow No. 84 of the Farm G. in K.]—*Berlin. tierärztl. Wschr.* **46.** 913-919, 933-938 and 953-957. 8 plates. 1 table. [38 refs.]

In spite of the work carried out by KLIMMER and HAUPT and other authors, our knowledge of streptococcal mastitis is incomplete.

The authors describe a very detailed clinical, bacteriological and pathological study of a case of the disease ; [“*galt*” means dried-up.]

They investigated systematically the cell content of morning and evening milk and correlated the results of these examinations with the incidence of streptococci in the samples and with the changes in the composition of the milk.

In recent infections, streptococci are most numerous in the fore- and mid-milk, but in chronic cases they are most numerous in the stripplings ; they disappear completely from seriously affected quarters shortly before the udder becomes dry. When carrying out mastitis investigations, it is preferable to concentrate on a mixture of fore-milk and stripplings.

Although hard centres can be detected in affected udders during life, these lesions are scarcely, if at all, recognisable after death, either by manipulation or by histological examination.

The authors believe that the variation in the length of the chains of streptococci in milk is an artefact due to differences in the manner of using the centrifuge. They disagree with KLIMMER and HAUPT regarding the cultivability of the streptococci of the fore-milk. It is probable that organisms of the non-specific bacterial flora of the udder can produce clinical conditions resembling streptococcal mastitis.

ROSELL, J. M. (1931). **Studies on Contagious Streptococcal Mastitis.**—*Cornell Vet.* **21.** 80-85.

The author, working on cases of chronic contagious streptococcal mastitis, has found that the physiological values of the pH and of chlorine, catalase, and lactose are very constant in healthy cows and that variations from the physiological normals should be considered as indications of a deranged function of the udder. The chemical tests, such as the pH, catalase and chlorine determinations, can be used as a basis for diagnosis in a larger percentage of cases than single bacteriological tests.

As a result of the examination of 300 cows on 15 farms, he found that 58 per cent. had abnormal udders and that only 40 per cent. of the udders could be regarded as normal.

The technique of simple tests which have been devised for the rapid estimation of the chemical changes in milk from diseased and normal udders are described in the paper. Fresh milk from healthy quarters has a pH of between 6.2 and 6.6 ; in milk derived from diseased udders the pH is below or above this figure. In 8 per cent. of cases, even where the milk had a normal pH, there was a pathological increase of catalase—a sure indication of the presence of lesions of inflammatory origin. Although the author could not establish a maximum normal limit for the quantity of chlorine, he believed that all milk containing more than 0.14 per cent., or 1.4 grammes per litre, indicated the existence of mastitis. Normal milk contains 4.4 per cent. of lactose but, in mastitis, lactose is greatly diminished in quantity or is entirely absent.

In combination with these simple tests, the appearance and sedimentation of the milk should be observed, while special search should be made for bacteria and leucocytes in the centrifuged deposit. In 10 c.c. of normal milk, obtained as aseptically as possible, there should not be more than 0.25-0.50 c.mm. of a whitish deposit.

The work described in the present paper was carried out on lines established by the National Research Council of Canada.

HAUPT, H. (1931). **Zur Biologie des *Streptococcus equi* und des *Streptococcus agalactiae*.** [On the Biology of *S. equi* and *S. agalactiae*.]—*Zbl. Bakt. (Orig.)* **120.** 291-304. 3 tables. [29 refs.]

*S. equi* can be differentiated by its inability to ferment lactose or sorbitol although various workers have stated that it can ferment lactose in milk or other nutrient fluids. Streptococci from cases of strangles are best isolated and grown on litmus milk in which, if they cause no change, they can be regarded as *S. equi*.

*S. agalactiae* is distinguished by its energetic fermentation of saccharose, its inability to attack raffinose, its flaky growth on lactose broth, its inability to alter methylene-blue milk and its ability to split hippurate. It also causes alpha haemolysis on Brown's blood agar plates. Litmus milk is rendered acid and reduction may follow.

For the isolation of mastitis streptococci from milk, the saccharose alkaline-albuminate, brom cresol purple agar of KLIMMER, HAUPt and Roots is most suitable. This medium is, however, not suitable for the selective cultivation of the organisms in infected material.

McEWEN, A. D., & ROBERTS, R. S. (1931). "Struck" Enteritis and Peritonitis of Sheep caused by a bacterial Toxin derived from the Alimentary Canal.—*J. Comp. Path. & Therap.* **44**. 26-49. 2 tables. [3 refs.]

This acute and fatal disease occurs among sheep grazing on the Romney Marsh, Kent, during the later winter and the spring months; at this season the pasture is short and the grazing comparatively scanty.

The disease is characterised by enteritis, peritonitis and toxæmia which are attributable to a toxin produced by *B. paludis*, a bacillus of the *B. welchii* type, growing in a pabulum of the contents of the small intestine. The toxin causes initial injury to the mucous membrane of the intestine and, passing the mucosal barrier, enters the body, giving rise to peritonitis and toxæmia.

*B. paludis* toxin has been demonstrated in the contents of the small intestine and once in the contents of the abomasum at, or very soon after, the time of death. Further, toxin has been found in considerable concentration in the peritoneal fluid when bacteria could not be demonstrated microscopically in the centrifugalised deposit of this fluid, though their presence could be demonstrated in cultures from it.

The characteristic lesions consist of an inflammation of the small intestine, sometimes complicated by ulceration and a very acute peritonitis, the subperitoneal vessels being injected, conspicuous and presenting areas of haemorrhage. There are also large accumulations of slightly turbid fluid in the peritoneal cavity, up to three litres or more, the turbidity being due to leucocytes. The remaining organs present, either no particular features or only degenerative changes associated with an acute toxæmia.

In some instances, the body tissues and fluids were sterile, but in others it was possible to cultivate *B. paludis*. The initial lesion in the intestine is a necrosis of the mucosa. When ulceration was present, gram-positive bacilli, morphologically similar to *B. paludis*, were sometimes found invading the tissues at the periphery of the ulcer.

In the absence of ulceration there was no evidence of any focus of bacterial growth within the body. The tissues of animals examined some hours after death showed very large numbers of *B. paludis* and, through the proliferation of this bacillus, changes were found in the musculature which in gross appearance were similar to the *ante-mortem* lesions of blackquarter.

The disease in all its characters was reproduced by feeding sheep with large quantities of *B. paludis* broth culture and by feeding the bacteria collected by centrifuging the broth cultures and resuspending the organisms in fresh nutrient broth. The feeding of toxin alone did not produce any symptoms of the disease, the toxin apparently being destroyed in the rumen and reticulum before reaching the abomasum or intestine in any appreciable amount.

CONDREA, P. (1931). Contributions à l'étude des variétés "smooth" et "rough" du Bacille Tétanique. [Contributions to the Study of the Smooth and Rough Varieties of *B. tetani*].—*C.R. Soc. Biol. Paris.* **107**. 188-190.

Three types of *B. tetani* have been isolated. These differ in the types of colonies they produce. Type D produce diffuse spreading colonies, when grown either in the depths or on the surface of agar medium. Type L produce well defined lenticular colonies and the third type La is considered to be an aberrant form.

Types D and L are regarded as smooth and rough forms respectively and should be named accordingly. The varieties are best isolated from deep agar cultures; surface cultivation is not so satisfactory.

MURRAY, T. J., & HEADLEE, M. R. (1931). Thermal Death Point. I. Spores of *Clostridium tetani*.—*J. Infect. Dis.* **48**. 436-456. 12 tables. [21 refs.]

MURRAY, T. J. (1931). **Thermal Death Point. II. Spores of *Bacillus anthracis*.**—*J. Infect. Dis.* **48.** 457-467. 6 tables. [16 refs.]

HEADLEE, M. R. (1931). **Thermal Death Point. III. Spores of *Clostridium welchii*.**—*J. Infect. Dis.* **48.** 468-483. 10 tables. [34 refs.]

These papers are concerned with the effect of varying the properties of the fluid in which a quantity of bacterial spores are suspended and the relationship which this bears to the destructive action of heat upon the spores.

The influence of varying concentrations of sodium chloride and of organic matter (peptone) and of changes in the pH of the solution were studied for *B. tetani*, *B. welchii* and *B. anthracis* spores.

The thermal death point for the spores when dry heat is used is also given.

SEDDON, H. R., BELSCHNER, H. G., & EDGAR, G. (1931). **Blackleg in Sheep in New South Wales.**—*Austral. Vet. J.* **7.** 2-18.

Five outbreaks of blackquarter were encountered in rams from 8 to 12 months old. Swellings of the head were present in between 40 to 80 per cent. of the cases and a number of animals seen alive were observed to be lame.

Lesions were confined to the more superficial muscles and the overlying subcutaneous tissues, the affected muscles being dark red, dry and glistening. The subcutaneous tissues and intermuscular tissues were infiltrated with a red serous fluid. Both affected muscles and infiltrating fluids were free from gas.

*B. chauvæi* was isolated from one case from each of three of the outbreaks. The bacillus was identified upon morphological grounds, the character of the lesions produced in guinea pigs and upon a limited number of immunity tests.

SORDELLI, A., & FERRARI, J. (1930). Algunas propiedades del suero antimicrobiano contra *B. perfringens*. [Some Properties of Anti-microbial Sera against *B. perfringens*].—*Revista Inst. Bacteriol. Buenos Aires.* **5.** 792-796. 4 tables.

The authors find that it is possible to produce antimicrobial antibodies by the intravenous injection of cultures of *B. perfringens*. In order to produce an active serum the injections must be continued for two to four months. Completely satisfactory results have not as yet been obtained, but the authors anticipate that the antiserum will be of value for diagnostic purposes.

FILDES, P., HARE, T., & WRIGHT, J. G. (1931). **A Case of Tetanus in a Cat.**—*Vet. Rec.* **11.** 781.

BATEMAN, J. K. (1931). **Tetanus in a Kitten.**—*Vet. Rec.* **11.** 805.

The first paper gives an account of tetanus in a cat which had been caught in a trap. The authors were able to isolate *Cl. tetani* from an injured leg and believe that this is the first recorded case of this infection in a cat.

BATEMAN gives a case record of clinical tetanus which was observed in 1925 in a kitten; the infection was evidently contracted through a castration wound and death occurred in three days. Diagnosis was based on the characteristic clinical picture.

BLIECK, L. de, & JANSFN, Jac. (1931). Gasoedeem bij Kippen na Bloedtappen. [Gas oedema in Fowls after taking Blood Samples].—*Tijdschr. Diergeneesk.* **58.** 513-518. 2 text figs.

The authors record a serious accident which followed the collection of blood from a large number of fowls for the purpose of agglutination tests. Blood was collected in the usual way from 304 birds and cotton wool soaked in ferric perchloride solution was used to dress the wounds. Within four days, 66 of the birds were dead. Bacteriological examination showed that death was due to infection with organisms of the gas-gangrene group (*B. welchii*, *V. septique* and Novy's

bacillus). Experiments showed that the infection was favoured by the use of the cotton wool plugs and the ferric perchloride.

EDGAR, G. (1931). **Anaërobic Infection in Sheep brought about by the Attack of Crows (*Corvus spp.*) ("Crow Pick").**—*Austral. Vet. J.* 7. 64-68. 2 tables.

In New South Wales, two kinds of crows, *Corvus coronoides* and *C. cecilae* sometimes attack sheep, usually lambing ewes, but also any sheep in a debilitated condition. Sometimes a number of these fierce crows make a sudden attack on a single sheep in a flock confined in a yard. The birds usually attack the eyes and if, as it often the case, they succeed in tearing one out, gangrene of the orbit follows and the sheep dies in a few days.

The author made bacteriological examinations of the orbital tissue of some injured sheep and, from 27 swabs taken, more than half gave a growth of *Cl. welchii*, *Cl. aëdematiens* and *Cl. aëdematis maligni*, the first named being the commonest.

A number of crows were killed and the beaks were taken for bacteriological examination. In these crows, the upper part of the beak is about half an inch longer than the lower and the unopposed space in the upper part was always found packed with soil and other matter. The beak content of 35 crows was examined and pathogenic anaerobes were found in all of them, *Cl. welchii* in every case, *Cl. aëdematiens* in four cases and *Cl. aëdematis maligni* once. Losses from this cause are not very great.

Prevention is practically impossible and sheep can only be saved if the injured orbit is dressed fairly soon after the injury; hydrogen peroxide is advocated.

HADLEY, Philip, DELVES, Edna, & KLIMEK, John. (1931). **The Filterable Forms of Bacteria.**

**I. A Filterable Stage in the Life History of the Shiga Dysentery Bacillus.**—*J. Infect. Dis.* 48. 1-159. 19 tables. [149 refs.]

The essential feature of this article is the author's description of a new cultural type of the Shiga bacillus that has proved readily and invariably filtrable through all grades of Berkefeld candles. It is important to note that this ("G") type of organism was obtained, not by filtration experiments, but by the cultural dissociation of the Shiga bacillus on similar lines to those employed to obtain "rough" and "smooth" variants.

It was found that the type "G" retained its characters for a number of sub-cultures and, by adopting a special plating technique, the "G" organism was repeatedly grown from filtrates of pure "G" cultures. The criterion of filtration was thus obtained, the same body being demonstrated on both sides of the filter.

The fact that special technique was required to produce growth from the filtrates and that filtration stabilized the "G" type would indicate that some filtrable, non-cultivable component, capable of giving rise to "G" organisms on repeated culture, existed in the "G" forms.

The possibility of the "G" type being a contamination was ruled out, first by elaborate controls and secondly by the fact that pure "G" cultures were made to revert to typical Shiga cultures; reversion was more difficult to bring about after filtration.

The authors were able to produce "G" colonies by the following methods:—

1. The use of selective media known to aid dissociation.
2. The use of peritoneal fluid.
3. The use of the bacteriophage.
4. The "ageing" of colonies in broth or on agar slants.
5. The picking-off of special secondary growths to "smooth" colonies growing on agar plates.

It was found that the "G" type had different morphological, serological, biochemical and toxicological characters from the "S" and "R" strains and that it was resistant to the action of the bacteriophage; reversion to the usual morphological and cultural parent type was accompanied by corresponding changes in the other characters. Both the "G" strain and the filtered virus were found to live for a very long time in sealed tubes.

The authors conclude with a discussion of the significance of these discoveries in relation to future bacteriological and other research.

LACHENSCHMID, B. (1931). Ueber den Keimgehalt der Gallen gesunder Schlachtkälber. [Bacterial Content of Bile of Healthy Calves as Examined at the Slaughterhouse].—*Zeitschr. Infektkr.* 39. 94-101.

WINTERS found the Gärtner bacillus in the bile of 2·5 per cent. of 550 calves which he examined. Statistical data published in certain annual reports of abattoirs in Germany indicate that the bacillus causes a specific infection in calves.

The author speaks of particular liver lesions—minute multiple areas of necrosis—which, on account of their small size, are often overlooked by the inspectors in the course of their naked-eye examinations. The relationship between these lesions and the Gärtner infection should be investigated.

He considers that enquiry should also be made as to whether the "ratin" bacteria, used for rat destruction in agricultural districts in Northern Germany, produce infection in calves.

He carried out a bacteriological examination of the bile of 550 healthy calves at the Munich abattoir to ascertain the incidence of the Gärtner infection in the gall bladder. Bacilli of the paratyphoid group were never found, but cocci, streptococci and certain bacilli were isolated from the material taken from 95, 1 and 104 calves respectively.

JONES, F. S., & LITTLE, R. B. (1931). The Etiology of Infectious Diarrhoea (Winter Scours) in Cattle.—*J. Exp. Med.* 53. 835-843.

JONES, F. S., & LITTLE, R. B. (1931). Vibronic Enteritis in Calves.—*Ibid.* 845.

JONES, F. S., ORCUTT, Marion, & LITTLE, R. B. (1931). Vibrios (*V. jejuni*, n.sp.) associated with intestinal Disorders of Cows and Calves.—*Ibid.* 853.

The authors had access to five herds in which 400 adult cattle became infected with a disease characterised by the frequent passage of liquid, foetid and sometimes blood-tinged faeces, accompanied by symptoms of abdominal pain, with dullness and refusal of food. The disease appeared suddenly and spread to most of the animals in the herd but not to the calves. Four *post-mortem* examinations were made and in all cases there was a catarrhal inflammation of the jejunum and ileum; the intestinal contents were fluid and contained mucus; the mesenteric glands were enlarged and juicy and in three cases the liver was friable and ochre in colour.

Bacteriological examination of the organs and blood yielded negative results and the only suspicious organisms isolated from the intestinal contents were *B. coli* and a *B. coli* mutant.

45 c.c. amounts of a culture of these organisms fed to calves failed to produce disease and the bacilli did not become established in the intestines.

The disease was reproduced in calves by feeding intestinal contents from infected animals. Cultures made from the intestinal contents of these experimental animals yielded *B. coli*, but the washed mucosa of the jejunum when thinly sown on serum agar slants gave cultures of a small motile vibrio. Pure subcultures of the vibrio were fed to three calves and one heifer; the disease was reproduced in all four animals and the vibrio was recovered from three of them.

Strong circumstantial evidence is adduced to prove that the disease was not caused by dietetic errors.

A similar disease (vibronic enteritis) affecting calves is described. Eight *post-mortem* examinations are recorded and in all cases a small motile vibrio was isolated directly from the natural cases. Experimental transmission was accomplished by penning three healthy calves with an infected animal and by feeding cultures of the vibrio.

Bacteriological investigation showed that the vibrios isolated both from adult cattle and from calves possessed relatively delicate nutritional requirements; they were gram-negative, they possessed one or two flagellae at each pole, they were killed on exposure to air or to a temperature of 55° C. for five minutes, but survived for six days in autoclaved bovine faeces. The pathogenicity of the organisms for laboratory animals was low although, like the comma vibrio, when inoculated intravenously into rabbits, they produced disease and penetrated the intestinal wall. Agglutination and agglutinin absorption tests showed that the vibrios isolated from these cases belonged to two immunological groups, both of which differed antigenically from *V. foetus*. They differed from the comma vibrio in that they failed to liquefy gelatin or serum and were less easily cultivated.

The authors propose the name *Vibrio jejuni* for the organism described.

GRAHAM, R., & THORP, F. (1931). **A Laryngotracheitis Syndrome in wild Goose associated with Pneumomycosis.**—*J. Amer. Vet. Med. Ass.* **79.** 90-94. 3 figs.

A goose which had shown the characteristic clinical symptoms of laryngotracheitis was examined *post-mortem*. A histological examination showed mycotic pneumonia. Attempts to infect healthy chicks by intravenous, intralaryngeal and intraperitoneal inoculation with unaltered tracheal exudate from the goose yielded negative results. Filtered tracheal exudate injected intravenously into healthy chicks failed to infect them, thus excluding genuine infectious laryngotracheitis of poultry.

BARDELLI, Plinio, & CILLI, Vittorio. (1931). **Osteo-mielite tibiale primitiva di origine centrale da "Cryptococcus farciminosus Rivoltæ."** [Primary Osteo-myelitis of the Tibia caused by the *Cryptococcus farciminosus* of Rivolta.]—*Clin. Vet. Milano.* **54.** 1-4. 2 figs.

The authors describe a case of osteo-myelitis of the left tibia of a horse due to the *Cryptococcus farciminosus*. No recognisable abnormality could be found in the course of a careful clinical examination, but percussion of the upper third of the tibia caused a pronounced reaction and great pain. The animal was destroyed and the diseased bone was removed for examination. No abnormality could be detected externally, but upon longitudinal section the marrow was found to be congested and a small quantity of syrupy liquid of a dirty-yellow colour was present in the medullary space. In the interior of the tibial crest, there was a purulent centre measuring about  $2 \times 1$  cm., which was surrounded by a zone of reaction—a condensing ostitis—about 5 mm. in width. Numerous cryptococci were found in the purulent liquid.

One of the authors (Cilli) records the occurrence of a similar case.

#### DISEASES CAUSED BY PROTOZOAN PARASITES.

HALL, G. Norman. (1930). **Trypanosomiasis.** *5th Ann. Rep. of the Vet. Lab. Vom. N. Prov., Nigeria, for the year ending 31st December, 1929.—Ann. Rep. Vet. Dept. N. Prov., Nigeria, 74-76.* Lagos : Govt. Printer [5s. 6d.]

Of the two pathological species of trypanosome in Nigeria, *T. congolense* is in general more virulent and more resistant to treatment than *T. vivax*. No apparent ill-effects resulted from the independent inoculation of three strains of *T. congolense* and three of *T. vivax* into cattle, but when the two species were inoculated together, an acute fatal illness developed; *T. congolense* predominated in the blood but *T. vivax* was rarely seen.

No really satisfactory method of microscopical diagnosis is known; the mercuric chloride test used by BENNETT had no diagnostic value for cattle and goats; the use of the adhesion phenomenon as a test (technique of DAVIS and BROWNE) was only successful in some *T. congolense* infections; routine blood and gland smear examination is unsatisfactory.

The use of six injections of tartar emetic for the treatment of infected cattle has yielded successful results as tested by the results of blood examinations. This drug is, however, very toxic to animals in poor condition and must be used with care.

BESSEMANS, A., & CANNEYT, J. van. (1931). **Néoformations tumorales sur le fourreau du pénis chez le Lapin, dues au *Treponema cuniculi*.** [Tumours of the Prepuce in Rabbits caused by *T. cuniculi*.]—*C.R. Soc. Biol. Paris.* **107.** 282-284. [3 refs.]

A description of two experimental infections in male rabbits produced by scarification of the inner wall of the prepuce and the application of material obtained from the vagina of an infected female. In the first case, small nodular tumours which persisted for 11 months developed at the junction of the mucous membrane and skin and numerous *T. cuniculi* were obtainable from these nodules. In the second case, similar nodules only persisted for two weeks and disappeared.

The author draws attention to the preference shown by this parasite for sites of junction of the mucous and cutaneous surfaces for the production of lesions.

KRANEFELD, F. C. (1931). Enkele overbrengingsproeven van *Trypanosoma theileri* Laveran, 1902 met Tabaniden. [Some Experiments in the Transmission of *Trypanosoma theileri* Laveran, 1902 with Tabanidae].—Ned.-Indisch. Blad. v. Diergeneesk. 43. 182-192. 20 tables. [38 refs.]

The author groups *T. lewisi*, *T. melophagium*, and *T. theileri* together and points out that, while a considerable amount of work has been done regarding the life history and transmission of the first two of these, little or nothing is known regarding the latter.

In view of the discovery that the cattle and buffaloes in the Dutch East Indies were heavily infected with *T. theileri*, it appeared to be certain that the transmitting agent must be present in large numbers and, naturally, *Tabanidae* came under suspicion.

Examination of the gut contents of *T. striatus* and *T. rubidus*, in particular, and of other flies in general, showed that flagellates were present in about 20 per cent. of them. It was of course realised that these flagellates were not all developmental stages of *T. theileri*. Wild specimens of *T. striatus* and *T. rubidus* were selected principally for experimental purposes because these species occur most commonly in Buitenzorg.

Cattle and buffaloes were used for the experiments and precautions were taken to ensure that they were not previously infected with *T. theileri*. The flies were kept in the laboratory for 89 to 99 hours before they were used for experiment with the object of eliminating, as far as possible, natural contamination, that is to say, contamination which would enable them to act as mechanical carriers.

Infection occurred in some cases in which the trypanosome was probably, but not certainly, transmitted by the bites of the flies (*T. striatus*); in other cases infection occurred when material containing flagellates from the flies was smeared on the mucous membranes of the mouth and vagina.

Parallel experiments with *T. rubidus* gave consistently negative results. The significance of this difference is not known.

The results of these experiments leave the method of natural infection still uncertain.

TUBANGUI, Marcos A., & YUTUC, Lope M. (1931). The Resistance and the Blood Sugar of Animals infected with *Trypanosoma evansi*.—Philippine J. Sci. 45. 98-107. 7 figures. [15 refs.]

SICE, A., BOISSEAU, R., PROVOST, J., & DENIEL. 1931). Le quotient albumineux du sérum chez quelques trypanosomés. [The albuminous Quotient of the Serum of some trypanosoma-affected Individuals].—Bull. Soc. Path. exotique. 24. 181-184. 2 tables. [1 ref.]

Working with *Trypanosoma evansi* on white rats, guinea pigs, cats, dogs and horses, the authors found that hypoglycæmia was absent in the experimental disease except in the premortal stages. This confirmed the results obtained by ZOTTA and RADOCOVICI with Nagana. The resistance offered varied with the animal; the guinea pig offered strong resistance, the rat little. The cat, dog and horse took an intermediate position, but in all except the guinea pig, death occurred when parasites were most numerous in the blood. There was no evidence to connect the blood-sugar content with resistance.

In human beings affected with *Trypanosoma gambiense* in French Equatorial Africa, the authors found that the albuminous quotient of the blood was low; the serum albumin was reduced and the globulin was sometimes slightly increased in amount. These changes were found in both the first and second periods of infection. This agrees with the work of MAYER on *Trypanosoma brucei* in the dog.

SERGENT, E., DONATIEN, A., PARROT, L., & LESTOQUARD, F. (1931). Du mode de transmission de la theilériose bovine nord-africaine par la tique *Hyalomma mauritanicum*. [On the Mode of Transmission of North-African Bovine Theileriasis by the tick *H. mauritanicum*].—G.R. Acad. Sci. Paris. 192. 253-255. [1 ref.]

The authors found by experiment that the tick *H. mauritanicum* becomes infected in the larval and nymphal stages and transmits *T. dispar* as an adult of the same generation. The incubation period of the disease in calves is 9-18 days after infected adult ticks have been placed on them.

Ticks obtained from natural cases have also transmitted the parasites as adults. Both male and female ticks can transmit the infection and, in one out of three cases, a male tick infected two calves successively. Transmission by a larval tick was observed in one case. Although *Rhipicephalus* does not transmit East Coast Fever till it has been attached for 60 or more hours, *Hyalomma* can transmit North African theileriasis at an earlier time point.

Investigations on the question of the passage of *Theileria* from adult ticks to their offspring have given uniformly negative results.

SERGENT, E., DONATIEN, A., PARROT, L., & LESTOQUARD, F. (1931). Considérations étiologiques sur la theilériose bovine nord-africaine. [On the Etiology of North-African Bovine Theileriasis].—*C.R. Acad. Sci. Paris.* **192.** 393-395. [1 ref.]

This disease occurs as an annual outbreak in the early summer and lasts for about three months. About half of all the cases occur in July. Adult cattle which escaped infection when young are very susceptible and usually die when they contract infection. Survivors become carriers and can infect *Hyalomma mauritanicum* ticks up to four months after recovery.

Larval ticks are present in the autumn and remain on one animal until they become nymphs. This stage of the development takes about two weeks; the engorged nymphs then fall to the ground where they pass the winter. At the beginning of the following summer, the nymphs moult, become adults and attach themselves to a second host which they infect with *Theileria*. Gorged female ticks drop off after 10-12 days, lay eggs and die. The larvæ hatch out in six weeks.

MIESSNER, H. (1931). Piroplasmosen und Splenektomie. [Piroplasmoses and Splenectomy].—*Arch. wiss. prakt. Tierhkl.* **63.** 78-90. [31 refs.]

An account of experimental piroplasmosis in splenectomised dogs and cattle. After splenectomy, dogs infected with *B. canis* showed relapses which were more severe than the original infection, but the parasites eventually disappeared from the circulation. Cattle infected with *B. bovis* and *B. bigemina* relapsed and died after splenectomy. The results indicate clearly the protective rôle played by the spleen in bovine and canine piroplasmosis.

MORGAN, E. (1931). Ovine Piroplasmosis in Venezuela.—*Vet. J.* **87.** 272-274.

This is a belated record of the finding of piroplasmosis in sheep in Venezuela, at least 10 years ago, and is possibly the first report on the condition in that country. The author demonstrated the parasites in preparations from affected sheep. The disease occurred in breeding ewes which had been transported by sea from one part of the country to another. The symptoms were lassitude, dysentery and haemoglobinuria; jaundice occurred in delayed cases. Death usually followed and *post-mortem* examinations revealed icterus, an enlarged spleen, enteritis of the small intestine and dark red urine. The author reports further that pedigree rams, imported from England, resisted piroplasmosis [they were accustomed to hand feeding and used salt licks which were available and he attributes their resistance to this factor] whilst indigenous sheep placed with them became affected.

The author strongly advocates the value of salt for livestock exposed to Venezuelan piroplasmoses.

STILES, George W. (1931). Anaplasmosis in Cattle.—*Circular 154. U.S. Dep. Agric.*

Anaplasmosis has been recognised in many of the United States, in temperate as well as in tropical zones. The mortality may be as high as 40 per cent. and serious losses result from emaciation and suspension of lactation in animals that recover. An animal may still be a carrier after several years although it is apparently in perfect health.

The author gives an account of the causal parasite, *Anaplasma marginale*, and of the symptomatology and morbid anatomy of the disease; it must be differentiated from tick fever, anthrax and tology and morbid anatomy of the disease; it must be differentiated from "tick fever," anthrax and haemorrhagic septicæmia.

Mechanical transmission as the result of "dehorning" operations has been proved to occur and other invertebrate parasites, in addition to ticks, may be vectors of the infection.

BRUMPT, E. (1930). Rechutes parasitaires intenses, dues à la splénectomie, au cours d'infections latentes à *Aegyptianella*, chez la poule. [Severe Parasitic Relapses in the Fowl due to Splenectomy, in the Course of latent Infection with *Aegyptianella*].—*C.R. Acad. Sci. Paris.* **191.** 1028-1030. [1 ref.]

The author investigated the effect of splenectomy on fowls which had been infected, some weeks or months previously, with *Ae. pullorum* Carpano. This parasite was discovered in 1911 by BALFOUR at Khartoum in fowls which were simultaneously infected with spirochaetosis. Its separate identity was confirmed by CARPANO in 1929.

Brumpt, working at Khartoum, infected fowls, chickens, geese, ducks and quails. Turkeys, guinea fowl, pigeons, canaries and turtle doves were resistant. He transmitted the infection in fowls up to the sixth passage.

Splenectomy was performed on a cock and a hen in which the disease was quiescent after artificial infection with *Ae. pullorum* nine months and 13 weeks beforehand respectively. The number of parasites increased in them rapidly up to the 16th or the 19th day after the operation. From that time the number of parasites decreased fairly rapidly and the birds recovered their normal health without ever suffering severe illness.

The spleen evidently exerts a protective action against infection with *Aegyptianella*, but, as such infected birds survived its extirpation, it is probable that other body tissues take on this function.

KERR, W. R., & BOTHAM, G. H. (1931). Iodine in the Control and Treatment of Avian Coccidiosis.—*Vet. J.* **87.** 10-24. 8 tables. [22 refs.]

The authors describe a number of experiments carried out to determine the value of certain drugs in the treatment of avian coccidiosis. They obtained favourable results, both experimentally and in the field, by combining suitable sanitary measures with the use of iodine in milk.

DONATIEN, A., & LESTOQUARD, F. (1931). Présence d'*Aegyptianella pullorum* chez les poules en Algérie. [Presence of *Ae. pullorum* in Poultry in Algeria].—*Bull. Soc. Path. exotique.* **24.** 371-372.

In 1930, the authors found an endo-corporeal blood parasite in Algerian fowls. They consider that it is identical with *Aegyptianella pullorum* Carpano, 1928.

It is pathogenic and causes anaemia which is sometimes fatal. No association with *Spirochæta gallinarum* was observed in these cases.

#### DISEASES CAUSED BY FILTERABLE VIRUSES.

PYL, G. (1931). Adsorptionsversuche mit Maul- und Klauenseuchevirus in Pufferlösungen. [Adsorption Experiments with the Foot and Mouth Disease Virus in Buffer Solutions].—*Zbl. Bakt. (Orig.)* **121.** 10-19. 10 tables. [15 refs.]

PYL, G. (1931). Ueber Methoden zur Anreicherung des Maul- und Klauenseuchevirus aus virushaltigen Substraten. [On Methods of Enriching the Foot and Mouth Disease Virus in virus-containing Substrates].—*Zbl. Bakt. (Ref.)* **102.** 284-285.

[NOTE.—The second of these papers is a summary of the first one and was presented at the meeting of the *Berliner mikrobiologische Gesellschaft* on the 27th April, 1931.]

Hitherto ultrafiltration has been the only method of obtaining virus from material in which

it is present in very small amounts ("under-infected" material). This laborious method has now been superseded by one of enrichment by adsorbing the virus from tissues and fluids by various substances, such as charcoal, aluminium hydrate and kaolin. Charcoal functions in all degrees of pH, aluminium hydrate in an alkaline medium at pH 9.2 and kaolin at pH 7.6.

Virus in material containing very small amounts can be concentrated a thousandfold. It can be adsorbed from urine in buffer solutions, but a modified method involving preliminary protein precipitation is necessary for blood.

WALDMANN, O., TRAUTWEIN, K., & PYL, G. (1931). Die Persistenz des Maul- und Klauen-seuchavirus in Körper durchgesiechter Tiere und seine Ausscheidung. [The Persistence of the Foot and Mouth Disease Virus in the Body and Excretions of Recovered Animals].—*Zlb. Bakt. (Orig.)* 121. 19-32. 7 tables. [36 refs.]

WALDMANN. (1931). Der experimentelle Nachweis von Dauerausscheidern bei Maul- und Klauenseuche. [The Experimental Demonstration of "Carriers" in Foot and Mouth Disease].—*Zlb. Bakt. (Ref.)* 102. 285-286.

[NOTE.—The second of these papers is a summary of the first and was presented at the meeting on 27th April, 1931, of the *Berliner mikrobiologische Gesellschaft*.]

There is sometimes a recurrence of foot and mouth disease after a previous outbreak in localities which had been considered to be again free from infection. This recurrence must be due either to the presence of true carriers and excretors of the virus or to the existence, for a long period, of potent virus in a dry state on the skins of cattle.

By means of the method described by PYL (see this *Bulletin*. 1. 211) for the demonstration of the virus by enrichment methods, it has been possible to isolate it when present in extremely small amounts in blood, organs and urine.

In the course of applying the method to the blood of 98 guinea pigs, all of which appeared to be in perfect health, the virus was found in 10 instances at periods extending from 8-24 days after infection. In six cases out of 569, virus was found in extracts made from the kidneys, the bladder and urine over a period varying from 8-94 days after infection; it was found only up to the 11th day in the testicles.

A search was made for virus in the blood and urine of 500 cattle. It was found in the blood of 2.6 per cent. of them on and after the 7th day. In eight animals whose blood contained virus, the urine was tested from the 8th day onwards. Virus was present in the urine from six of them at varying intervals from the 6th-246th day after infection, but it was not excreted in urine at the same times as it was present in the blood.

HECKE. (1931). Züchtung der Maul- und Klauenseuchenerregers. [Culture of Foot and Mouth Disease Virus].—*Zlb. Bakt. (Ref.)* 102. 283-284.

[NOTE.—A paper presented at the meeting of the *Berliner mikrobiologische Gesellschaft* on the 27th April, 1931.]

Virus is first sown on infected guinea pig plasma, then transferred to normal plasma. After a time, growth ceases on this medium and the virus dies out. This is apparently due to the accumulation of acid metabolic products which are readily produced at 37° C.; if cultures are kept at 30° C., the life of the virus can be preserved for as long as 81 days and, at this time, it has increased  $10^{18}$  times.

Virus has been preserved for 181 days by subculturing. In addition to embryonic guinea pig skin, adult testicular tissue also serves as a culture medium, but it is less efficient. Foetal lung tissue is good and virus has been grown with medium prepared from it for 15 passages over a period of 76 days.

The details of the technique are described.

TRAUTWEIN. (1931). Die Pluralität des Maul- und Klauenseuche-virus und die letzte Epizootie. [The Plurality of the Foot and Mouth Disease Virus and the last Epizootic].—*Zts. Bakter.* (Ref.) 102. 283.

[NOTE.—A paper presented at the meeting of the *Berliner mikrobiologische Gesellschaft* on the 27th April, 1931.]

In the outbreak of foot and mouth disease which occurred last year in Germany, the chief type of virus found was an A type variant (Vallée O type). This variant differed appreciably from the standard A type; only 40 per cent. of the cattle immunised with it were resistant to the standard A virus. The converse also held true. Cattle could be successively infected four times; with the three standard types and with this variant. Immune serum towards the A variant was only slightly protective against the standard A virus and *vice versa*.

In an instance in which an outbreak recurred, it was found that the first one was caused by the A variant type virus and the second one (nine weeks later) by the C type.

This observation is of great interest as it postulates the power of an inter-transformation between the types of the foot and mouth disease virus.

HEELSBERGEN, T. van. (1931). Contamination d'une lymphe vaccinale par le virus de la fièvre aphteuse. [Contamination of Smallpox Lymph by Foot and Mouth Disease Virus].—*Ann. Inst. Pasteur.* 46. 558-564. 2 figs. [1 ref.]

With the object of finding out whether the Norwegian cow pox lymph, which had produced foot and mouth disease in susceptible animals, was in reality contaminated with the latter virus, the author tested some of the particular Norwegian lymph (No. 980) on a calf. This animal was inoculated on the skin of the abdomen and in two days showed typical mouth lesions of foot and mouth disease. Soon afterwards, the skin of the abdomen showed a typical cow pox eruption.

Another calf developed foot and mouth disease after being inoculated by scarification on the mouth and abdominal skin with material from the mouth lesions on the first animal. Cow pox lesions did not, however, develop, and a similar negative result occurred in a rabbit inoculated by scarification with the same material.

The original Norwegian lymph was then purified by passage through fowls. Some of the purified material was inoculated into the second calf after it had recovered from the attack of foot and mouth disease; the calf contracted cow pox. This purified cow pox virus was then passed successively through two fresh calves; they contracted cow pox alone and, later, contracted foot and mouth disease when exposed to infection.

Thus the original Norwegian lymph contained both viruses and the foot and mouth disease virus present had not become attenuated. After the original lymph had been passed through fowls, it was incapable of conferring immunity to foot and mouth disease.

DIERMEN, F. A. A. (1931). Het Verband tusschen Koepokken en Mond- en Klauwzeer. [The Connection between Cow Pox and Foot and Mouth Disease].—*Tijdschr. Dierengesek.* 58. 354-357.

In this brief note the author describes an experiment in which he vaccinated a herd of 18 bovines with cow pox vaccine. Foot and mouth disease subsequently broke out. The vaccinated animals possessed no resistance and the conclusion is, therefore, drawn that there is no connection between the two diseases.

HALL, G. Norman. (1930). Rinderpest. 5th Ann. Rep. of the Vet. Lab. Vom. N. Prov., Nigeria, for the year ending 31st Dec., 1929. Ann. Rep. Vet. Dept. N. Prov., Nigeria. 53-68. 1 table. Lagos, Govt. Printer. [5s. 6d.] [fcp.]

Anti-rinderpest serum, prepared by intramuscular hyperimmunisation, was found to be of superior potency to that prepared by intraruminal injection; the author considers that further tests on a larger scale are necessary to confirm these results.

The injection of trypan blue into virus producers did not affect the potency of the virus in their blood; the drug can, therefore, be used with safety to eliminate piroplasms from the blood of these animals. Hall similarly studied the effect of administering a single dose of tartar emetic to eliminate trypanosomiasis temporarily from their blood; he found that 0.5 g. eliminated *T. vivax*, but that, in mixed infections with *T. vivax* and *T. congolense*, although the former was never seen in the course of regular blood film examination carried out for nine weeks, the latter survived.

Some experiments were carried out with formolised spleen vaccine, formolised spleen, gland and kidney vaccine, and chloroformed spleen pulp vaccine (modification of KESLER's method). The organs used were those from an animal inoculated for the purpose of hyperimmunisation, and they were taken immediately after it had been bled out at the height of the temperature reaction. Formolised or chloroformed spleen pulp and mixed formolised spleen and gland vaccines were all found to protect against 2 c.c. of virulent blood given 14 days later, but they did not protect efficiently before the 14th day. The duration of the immunity is as yet undetermined. Vaccines containing kidney tissue were not so efficient. Vaccine kept for 72 days in the dark at room temperature retained its protective value; the virus in the vaccine, however, did not appear to be viable after seven days.

Rinderpest occurs in goats, with an incubation period of 4-5 days. The symptoms are similar to those seen in the cattle, except that buccal lesions do not occur until after the 10th day; pulmonary complications are common. A temperature reaction of over 103° C. in the goat was considered to be above the normal. Cross infection with bovine and goat viruses was carried out and both bovines and goats could be infected with blood of a goat infected by contact. Contact infection occurred between infected goats and bovines, and between infected bovines and goats.

ALLAN, W. A. (1931). **Rinderpest : Toro Vaccine Experiments.**—*Ann. Rep. Vet. Dept. Uganda Protectorate for 1930.* 21-23. Entebbe : Govt. Printer.

Describes experiments on rinderpest immunisation with spleen extract obtained from natural cases and from artificially infected animals. Some successful results were obtained when the spleen provider received virus that had previously been passed through two or three animals. Resistance to a subsequent injection of natural virus was conferred by the administration of both single and double dose vaccination to the small number of animals used in the test. The variable potency of virus in natural cases of rinderpest constitutes a great hindrance to successful vaccination.

BEDERKE, O. (1931). An der transkaukasischen Rinderpestgrenze. [The Rinderpest Quarantine Posts on the Transcaucasian Frontier].—*Berl. tierärztl. Wschr.* 47. 186-187.

100,000 litres of anti-rinderpest serum are prepared annually at three local stations for use in the rinderpest danger zone of the Transcaucasian Republic of the Soviet Union. All infected animals are slaughtered and suspected cattle are given simultaneous inoculation; serum alone has given such poor results that it is rapidly falling into disuse.

Officers of the state veterinary service operate along a line of established outposts on the Turco-Persian frontier. After an intensive campaign lasting eight years, the disease which swept nearly the whole of Russia-in-Europe during the revolution between 1918 and 1923 was eradicated by 1929.

Single outbreaks occur among imported cattle and are rapidly stamped out. There is a quarantine zone where in-contact animals are given serum-simultaneous inoculation; there is careful supervision and ruthless slaughter on the inside boundary of the quarantine zone.

MCBRYDE, C. N., NILES, W. B., & COLE, G. G. (1931). **Experiments to determine the Effect of Sodium hydroxid and Calcium hydroxid on the Virus of Hog Cholera.**—*J. Amer. Vet. Med. Ass.* 79. 87-89. 1 table.

The addition to virulent hog cholera blood of 3 per cent. of a 10 per cent. solution of sodium hydroxide, combined with 2 per cent. of a 20 per cent. solution of milk of lime, killed the virus in 15 minutes.

Two per cent. of a 10 per cent. solution of sodium hydroxide combined with a 2 per cent. of a 20 per cent. solution of milk of lime did not destroy the virus in blood within 30 minutes.

DAVID, Walter. (1931). Untersuchungen über das Verhalten des Schweinepestvirus bei Fäulnis und Antrocknung. [The Effects of Putrefaction and Drying upon the Virus of Swine Fever].—*Berl. tierärztl. Wschr.* **47.** 17-23. 9 tables. [19 refs.]

Although the subject has been studied by a number of investigators in different parts of the world, there are still gaps in our knowledge regarding the effects of putrefaction and drying upon the virus of swine fever. That there are such gaps is due, in part, to the fact that experiments are so costly because pigs are the only animals available for tests. Exact information on this point is, however, essential if control of the disease is to become a practicable measure.

He finds that the virus is present in the urine on the second day of illness and that of the virus in (1) secretions and excretions from infected animals and (2) in the organs, blood etc.

The author finds that the virus is present in the urine on the second day of illness and that, if such urine be kept either filtered or unfiltered at a temperature between 17° C. and 20° C., it loses its virulence in two days.

Blood retains its virulence longer than urine, but this depends largely upon whether it is obtained in a sterile manner or not. Virulent blood obtained when animals are bled without special precautions, will remain virulent up to a fortnight when kept at temperatures between 20° C. and 25° C., but blood taken so as to be free, or almost free, from bacteria and kept under the same conditions of temperature, will remain virulent up to about seven weeks.

The virus dies more rapidly under natural conditions in the outer world. Mixed with faeces at 18° C., the virus disappears in 42 to 90 hours; when mixed with garden soil, it may survive up to two weeks. In viscera that are undergoing putrefaction, the virus dies out very rapidly.

It is generally impossible to produce infection with tissue juice after three or four days, but survival is longer in bone marrow and positive results have been obtained up to a fortnight.

Drying, particularly when the medium contains a large amount of albumen, does not reduce the virulence of the virus.

The author finds that a convenient way of preserving the virus for experimental purposes and for despatching it to laboratories for diagnosis, is to soak strips of sterile filter paper in it and then to pack them after they have dried. In this way, the destruction of the virus by putrefactive decomposition is overcome.

The results which have been obtained in the experiments concerning the virulence of dried virus have an important bearing upon the question of disinfection. They indicate that the places upon which the virus may have been deposited and dried are more important than faeces etc.

GEIGER, W., & VEENBAAS, A. H. (1931). De Bestrijding van Varkenpest door Simultaanenting. [The Control of Swine Fever by the Simultaneous Method of Inoculation].—*Tijdschr. Diergeneesk.* **58.** 121-127. 3 tables.

The authors describe an experiment in which simultaneous inoculation with virus and serum was carried out on a farm where 13 pigs had already died. The serum was prepared at the Eystrup Institute for the Control of Swine Fever.

Thirty-three animals which were not recognisably affected and had normal temperatures were injected with 1 c.c. of virus and 25-40 c.c. doses of immune serum. Two of them became ill, but recovered.

Two diseased pigs were given double doses of serum and one recovered; six others which had high temperatures were given virus and serum and they recovered.

LUHRS, E. (1931). Die Bekämpfung der Schweinepest in Oldenburg. [The Control of Swine Fever in Oldenburg].—*Deuts. tierärztl. Wschr.* **39.** 290-295. With 1 curve.

Describes the swine fever outbreak of 1929 in Southern Oldenburg and the methods used for

its control. These included restrictions in the movement and marketing of pigs, the inspection of carcasses and the inoculation of animals at risk. Both serum alone and serum-simultaneous inoculations were carried out. Nearly 20 per cent. of the pigs treated with serum alone contracted swine fever later; only a few of those given serum-simultaneous inoculation became infected. Most of the young pigs of sows given serum-simultaneous treatment during pregnancy died from swine fever when exposed to infection after birth.

ATHERTON, I. K. (1931). **My Experience with Hog Cholera.**—*J. Amer. Vet. Med. Ass.* **78.** 355-363.

An account of the disease in the U.S.A. and of its history since DETMERS investigated it in the last century. Since the introduction of hog-cholera serum and virus by DORSET in 1908, the impression has developed that these agents are sufficient for eradication purposes and that hygiene is not of primary importance. The majority of outbreaks are caused by the moving of infected pigs to clean places; other means of spread are the feeding of infected garbage and the abuse of the serum-simultaneous method of inoculation.

State legislation to prohibit movement of infected pigs is urgently necessary for the control of the disease. Abuses of the serum-simultaneous method of inoculation must also be stopped.

Many outbreaks are the result of the farmers carrying out this inoculation themselves with the result that virus is given to unsuitable animals which succumb to the infection.

A campaign to educate farmers in the contra-indications for serum-simultaneous inoculation will go a long way towards reducing losses from this source.

BENNER, J. W. (1931). **Experiments on Hog Cholera and Dog Distemper.**—*Cornell Vet.* **21.** 1-14. [3 refs.]

The author states that the progeny of sows immune to hog cholera (swine fever) derive their passive immunity either through the placenta or through the colostrum, never through the milk.

He found that freshly prepared mixtures of hyperimmune serum and virus confer immunity without giving rise to any risk of infection.

A few experiments were carried out to ascertain the antigenic value of formolised spleen pulp and, although the results were considered to be promising, the number of experimental animals used was too small to permit of any definite conclusion.

The virus of hog cholera is not pathogenic for the dog and distemper virus confers no protection against the virus of hog cholera.

RUCKS, W., & MURRAY, C. (1931). **Infectivity of the Cells of Hog Cholera Blood.**—*J. Amer. Vet. Med. Ass.* **78.** 691-702. 11 tables. [7 refs.]

The object of this investigation was to determine whether the blood cells of pigs affected with hog cholera (swine fever) were infective after separation from the serum.

In a recent publication DUVAL stated that, in his experiments, blood cells were free from virus throughout the course of the disease and he, therefore, recommended the use of serum alone for experimental work.

DORSET, DINWIDDIE, and RODERICK and SCHALK, concluded from their investigations that the virus was contained principally in the blood cells.

The authors carried out a series of five experiments in which they separated the cells from the serum and subjected them to repeated washings in physiological salt solution.

They showed that the cells were highly infective after six, eight and 16 washings; they considered that, by using this technique, practically all virus was removed from external contact with the cells or diluted to such an extent as to be beyond the range of infectivity. [MCBRYDE has shown that the minimal lethal dose of hog cholera virus lies between 1/300,000 and 1/400,000 c.c.] The filtrate obtained by passing a haemolysed suspension of blood cells in distilled water through Berkefeld candles was sufficiently virulent to set up typical hog cholera when inoculated into susceptible pigs.

AUJESZKY, A. (1931). Wutschutzimpfung der Haustiere. [The Protective Inoculation of Domesticated Animals against Rabies].—*Deuts. tierärztl. Wschr.* 39. 113-119.

The author divides his paper, which is in the nature of a general review of the subject, into two parts dealing with (a) post-infectious inoculation; and (b) the protective immunisation of dogs.

He passes in review the various methods that have been devised to achieve these objects.

Rabies in the domesticated animals is usually preventable by means of post-infectious inoculation. To be practicable, the methods to be employed must possess certain characteristics. The immunisation must be carried out within a short period; it must involve only a small number of injections and it must be perfectly safe. Vaccines prepared from fixed virus by carbolic acid or ether and the diluted virus vaccine possess these characters. They are safe for animals in an advanced stage of pregnancy. The vaccination does not affect the milk yield and milk from animals undergoing immunisation can be sold with perfect safety.

Post-infectious inoculation must be carried out as soon as possible after infection (or suspected infection) has taken place, but this does not mean that it should be withheld if a few weeks have elapsed, because the period of incubation in horses and cattle, for instance, may be three months or even more.

Protective inoculation of dogs is not called for in countries where the disease is rare, but it should be practised systematically in places where rabies is common.

Special mention is made of the Japanese method of protective inoculation and of MIESSNER's method as being suitable for systematic use.

It is not advisable to carry out inoculation in the case of dogs which have been infected.

STUART, G., & KRIKORIAN, K. S. (1931). Anti-Rabies Immunisation Value of Killed Carbolised Virus in Cases of Wolf-bite.—*Trans. R. Soc. Trop. Med. Hyg. London.* 25. 49-56. 3 tables. [11 refs.]

VELU, H., & EYRAUD, R. (1931). Le vaccin japonais antirabique phéniqué offre-t-il des garanties suffisantes pour servir de base à prophylaxie spécifique. [Does the Japanese Phenolised Anti-Rabies Vaccine afford sufficient Protection to Warrant its Use as a Routine Method of Prophylaxis?].—*Bull. Acad. vét. de France.* 4. 171-172.

WATANABE, M. (1931). Sur le vaccin formolé antirabique. [The Formalised Antirabies Vaccine].—*J. Jap. Soc. Vet. Sci.* 10. 30. [NOTE.—Prepared from author's summary of original article in Japanese.]

In the case of several human beings bitten by rabid wolves, Stuart and Krikorian used carbolised fixed virus with complete success, giving intracutaneous inoculations on 14 consecutive days. Wolves are notably more dangerous vectors of rabies than dogs, owing to the severity of their bites, but none of the patients became infected. One patient, bitten by another rabid wolf three weeks after the first experience, did not succumb although not re-vaccinated. Rabicidal anti-bodies appeared in the blood at about the third week and commenced to disappear about the third month after vaccination. LUBINSKI and PRAUSNITZ may therefore be justified in stating that vaccination should be repeated if a further bite occurs three months or more after previous treatment.

Working with dogs, Velu and Eyraud found that repeated vaccination with a phenolised fixed virus vaccine over a period of six months did not protect all the experimental animals against intraocular inoculation of rabies-infected material. They therefore consider the method unsuitable as a means of specific prophylaxis.

Watanabe experimented on guinea pigs with a one per cent. formalised fixed virus vaccine, incubated for 48 hrs. at 37° C. He found that subcutaneous inoculation of the vaccine, repeated after seven days, protected against 100 lethal doses of fixed virus; the vaccine was still effective six months after preparation. The immunised guinea pig serum possessed rabicidal properties.

SCHOENING, H. W. (1931). Prophylactic Vaccination of Dogs against Rabies.—*J. Amer. Vet. Med. Ass.* 78. 703-707. [7 refs.]

This is a paper devoted to a comparison of two kinds of vaccine now in use in America, a phenol

treated vaccine containing 10-20 per cent. of brain tissue and a chloroform-treated vaccine containing  $33\frac{1}{3}$  per cent. of brain tissue. The points compared are:—(1) the capacity to immunise; (2) the safety of the method; and (3) duration of the immunity conferred.

With reference to the first point, the author tested phenolised vaccine on 12 dogs which were infected with virus at an unspecified subsequent date. Five died of rabies whilst nine out of 11 control dogs died. It was shown that this vaccine was not uniformly efficient and different batches of it varied although all were prepared from the same original street virus. Failures have occurred with the same vaccine in field use and the author wonders whether this is due to plurality of the rabies virus.

Chloroform-treated vaccine has been much more satisfactory and nine dogs tested with it all resisted street virus, whilst 11 out of 13 controls succumbed. As this vaccine is a new one, field results are not yet available.

Phenolised vaccine is quite safe if properly prepared, but cases of paralysis have occurred within a few days to several weeks after treatment. Complete recovery is, however, the rule. Chloroform vaccine is also safe and no cases of paralysis have been observed in experimental conditions following its use.

The possibility that vaccinated dogs may be hypersusceptible for a short time after inoculation from the occurrence of a negative phase is considered and the imposition of a short period of quarantine is proposed.

The duration of the immunity is not well known. The author knew a dog to be still immune one year after inoculation with the phenolised vaccine; dogs treated with chloroform vaccine are still immune after four months, but no data are available beyond that time.

The author gives general recommendations for the control of rabies; these include vaccination combined with licensing and quarantine of dogs.

NESBITT, R. E. (1931). **Rabies in Illinois.**—*Vet. Med.* **26.** 244-245.

Describes the legal control of rabies. Jurisdiction is held by the Department of Agriculture which may declare an area to be in quarantine and may require all dogs to be confined. Stray and unlicensed dogs must be destroyed by the police. Dogs which have had the single dose vaccination treatment need not be quarantined. Compensation is paid by the State for losses to stock caused by dogs, whether rabid or not; free treatment is provided for persons bitten. Sixty-five people have died of hydrophobia in Illinois in the last 11 years.

The author suggests several improvements on the existing system.

NEER, L. C. (1931). **Rabies Control in Ohio.**—*J. Amer. Vet. Med. Ass.* **78.** 708-709. [1 ref.]

The author complains of the inefficiency of various methods employed against rabies. Quarantine, licensing and muzzling orders are not obeyed by the public and, therefore, the disease continues to exist. Vaccination is not a safeguard as BROERMAN and EDGINGTON, of the Ohio Agricultural Experiment Station, have found that one vaccine protects against three strains of street virus, but not against a fourth. The problem of the unlicensed and stray dog must be solved before any advance in control is made.

The author offers suggestions for educating the public by newspapers and bulletins, etc.

[The question of virus plurality was discussed by REMLINGER and BAILLY. See this *Bulletin*, **1.** 53.]

GREIG, J. Russel, BROWNLEE, A., WILSON, D. R., & GORDON, W. S. (1931). **The Nature of Louping-ill.**—*Vet. Rec.* **11.** 325-333. 6 tables. [3 refs.]

An extension of the work described by POOL, BROWNLEE and WILSON (see this *Bulletin*, **1.** 57.)

Further work was carried out with material obtained from infected farms. The authors supplied material to the Department of Bacteriology, Edinburgh University, where filtrates were prepared which were found to be infective. They record that ALSTON and GIBSON produced the disease in

mice by intracerebral inoculation and were able to pass the infection from mouse to mouse in series. Mice are reliable animals for use in detecting the presence of the virus.

Infective material introduced into sheep by intra-nasal insufflation and by intradermal and subcutaneous inoculation, led to the development of resistance to a subsequent intracerebral inoculation with virulent material. Experiments carried out with ticks are described.

ALSTON, J. M., & GIBSON, H. J. (1931). **A Note on the Experimental Transmission of "Louping-ill" to Mice.**—*Brit. J. Exp. Path.* **12.** 82-88. 1 table. [4 refs.]

An account of work with the virus isolated by POOL, BROWNLEE and WILSON [see this *Bulletin* **1.** 57]. Mice were infected regularly when intracerebral inoculations of infective material were given. The incubation period before symptoms appeared was 5-9 days. The symptoms were considered to resemble those seen in infected sheep and are described. The virus was passed through three generations of mice without any apparent diminution in virulence. Control mice inoculated with sterile saline solution remained healthy. Similar inoculations into mice with brain suspensions from apparently healthy sheep gave inconclusive results as, although an odd mouse developed a suspicious illness, the remainder survived.

Uninoculated mice were considered to develop typical infections when placed in contact with affected ones.

GREEN, A. B., & EAGLES, G. H. (1931). **The Filterability of Vaccinia Virus.**—*Brit. J. Exp. Path.* **12.** 202-208. 6 tables. [9 refs.]

Despite the large number of experiments which various workers have carried out on the filterability of vaccinia virus, experiments involving the use of every imaginable device to ensure success, no final decision on this important point can yet be given.

YAOI and KASAI (1929) claimed that they obtained positive results with Berkefeld V filters, using fresh calf lymph adjusted to pH 8.0; filtrates of suspensions adjusted to pH 6-7 contained little or no virus. These authors stated that the preliminary passage of an acid solution of egg-white through the filters allowed the passage of virus through Berkefeld V and N filters with little loss of potency.

Green and Eagles found that vaccinia virus passed readily through Berkefeld V filters without much loss in potency. The use of acidified egg-white did not facilitate filtration and the pH of the suspension was of no importance as the virus passed whether the reaction was acid or alkaline.

They considered that the titration of the virus by the intradermal test yielded better results than the scarification method as it permitted the injection of a measured quantity of virus which was retained in the dermis.

The marked discrepancies in the results obtained by competent workers in filtration experiments with vaccinia virus must be attributed, to some extent at least, to the varying permeability of the filters used.

MCCLEAN, D., & EAGLES, G. H. (1931). **The Conservation of Vaccinia Virus grown in vitro.**—*Brit. J. Exp. Path.* **12.** 103-107. [5 refs.]

The authors carried out a series of tests to determine the optimum conditions for the preservation of culture virus.

They found that different samples of vaccinia virus, whether obtained by cultivation or passage, showed considerable variation in the rate of deterioration when stored under similar conditions.

Glycerol was apparently of little value for the preservation of vaccinia virus.

The addition of 1 per cent. phenol to virus kept in the cold ( $\pm 1^{\circ}$  C.) over long periods (209 days) did not cause any reduction in infectivity, but it was destroyed when frozen in the presence of phenol. The authors did not find a reliable method for the preservation of virus grown in chick embryo and plasma medium; the best results were obtained by storing it under anaërobic conditions in the presence of 0.25 per cent. agar at  $\pm 1^{\circ}$  C.

On the other hand, virus cultivated in the kidney medium of MAITLAND and LAING was satisfactorily preserved under anaërobic conditions in the cold.

The virus in unfiltered, cell-free, kidney extract was preserved under anaërobic conditions in the cold without great loss in potency, but the virus in filtered, cell-free, kidney extract, kept under similar conditions, deteriorated fairly rapidly.

JEZNIC, Josip. (1931). Beitrag zur Immunisation der Schafe gegen Schafpocken mittels Kalberrohvacine. [A Contribution to the Immunisation of Sheep against Sheep Pox by means of crude Calf Lymph.]—*Zeitschr. Immun. Forsch.* **69.** 443-448.

A large number of sheep developed typical reactions after inoculation with five days old vaccinia lymph prepared from calves. When inoculated later with sheep pox, they did not possess any immunity to that disease.

EAGLES, G. H., & McCLEAN, D. (1931). Cultivation of Vaccinia Virus in a Cell-free Medium.—*Brit. J. Exp. Path.* **12.** 97-102. 1 table. [4 refs.]

These experiments were undertaken to confirm some earlier work of the authors in which they found that vaccinia virus could be cultivated in an apparently cell-free medium. In the earlier work, there was a possibility that the medium might have contained some tissue débris and it was thought that the increase of virus may have been due to its presence.

In the present work two types of media were used, depending on the presence or absence of rabbit serum. To each medium was added "kidney extract," obtained by suspending finely ground rabbit kidney in Tyrode's solution, centrifuging at high speed for 20 mins. and removing the supernatant fluid. A good increase in vaccinia virus was obtained in this medium, with or without rabbit serum.

It was shown that even when the medium was passed through a Chamberland L2 filter which definitely excluded the possibility of any tissue débris being present, the vaccinia virus could be successfully cultivated. In one experiment in which a Berkefeld N filter was used, there was no increase in the amount of the virus.

It was observed that, in titration experiments, there was considerable variation in the reactions of individual rabbits, even to the same sample of virus.

LAIDLAW, P. P., & DUNKIN, G. W. (1931). Studies in Dog Distemper. VI. Dog Distemper Antiserum.—*J. Comp. Path. & Therap.* **44.** 1-25. 15 figs. [16 refs.]

DUNKIN, G. W. (1931). Dog Distemper Antiserum.—*Vet. Rec.* **11.** 368-370.

LAIDLAW, P. P., & DUNKIN, G. W. (1931). Dog Distemper Antiserum.—*Vet. Rec.* **11.** 359-363. 4 charts. [3 refs.]

These authors have found that the simultaneous inoculation of dogs on opposite sides of the body with a hyperimmune serum and virus, both of known potency, affords a solid protection against distemper lasting for at least two months and probably for life. Animals cannot, however, resist massive infection for three weeks after such inoculation. Under field conditions it is unlikely that inoculated animals run any considerable risk for such a long period as they would not usually be exposed to a really massive infection.

The serum is produced by inoculating a recovered or immunised dog with a large dose of potent virus on two successive days. When the antibody content of the blood is at its height, as shown by a complement fixation test, the dog is bled out. The potency of the sera was first tested by inoculation experiments on distemper-free dogs and serum prepared by the above method was found to be superior to two commercial products of uncertain preparation and standardisation.

This method of standardisation was not suitable for permanent use owing to the limited supply of suitable dogs. The use of ferrets was tested, but they gave inconstant results.

It was found that the complement fixing properties of a serum were closely related to the protective properties and this method has been adopted to standardise both serum and virus, but

it is recommended that such tests be coupled with experiments on "compound-bred" dogs. It is essential that the antigen employed in serum preparation be strong in virus.

BRON, S. (1931). Vaccination du Chien contre la maladie de Carré. [Vaccination of Dogs against Distemper].—*Rec. Méd. vét.* 107. 201-203. 1 table.

The author supports the use of LEBAILLY's vaccine and gives the results of the inoculation of 84 dogs with it. Sixteen of the dogs became infected and five died; the remaining 68 dogs did not contract the disease.

HINZ, W. (1931). Ein kasuistischer Beitrag zur Staupe-Immunisierung nach Laidlaw-Dunkin beim Frettchen. [A Contribution to the Immunisation of Ferrets against Distemper by the Laidlaw-Dunkin Method supplemented by a Case Report].—*Tierärztl. Rdsch.* 37. 351-352.

Eight ferrets inoculated subcutaneously with the Laidlaw-Dunkin vaccine remained healthy after inoculation with 0.5 c.c. of distemper virus eight days later, whereas two controls died.

KLIGLER, I. J., & ASCHNER, M. (1931). The Relation between Fowl-pox (Epithelioma Contagiosum) and Avian Diphtheria.—*Brit. J. Exp. Path.* 12. 35-42. 10 figs. [14 refs.]

According to the authors, confusion still exists as to the relationship between fowl pox and avian diphtheria and, as proof of this assertion, they mention the interchangeable use of the two terms. [This may be true as far as some laymen are concerned, but the unity of the two conditions is universally recognised by technical workers. It has been proved beyond any doubt that a reciprocal immunity exists between the lesions on the comb and those in the mouth.]

[The fact that the authors were able to produce diphtheritic lesions in the mouths of birds which had recently recovered from pox lesions on the comb is strong evidence to show that they were not dealing with pure fowl pox virus. The statement that fowl pox immunity is not always as solid as that produced by other virus diseases is not borne out either by laboratory experiments or by clinical experience.]

Kligler and Aschner concluded that fowl pox or contagious epithelioma and avian diphtheria are two distinct disease entities and that there is no cross immunity between these affections.

[The great success obtained in the immunisation of fowls against both forms of the disease by the use of pigeon pox virus is evidence of the inaccuracy of their conclusion.]

JOHNSON, W. T. (1931). The Effect of Fowl- and Pigeon-pox Virus Vaccination on Egg-production.—*J. Amer. Vet. Med. Ass.* 78. 98-101. 4 tables. [4 refs.]

During recent years, fowl pox virus has been used extensively as a vaccine for the immunisation of chickens. Although proved to be superior to the earlier vaccines in general use, it has not been found free from danger; its use on laying-stock has been contra-indicated as, occasionally, it has tended to reduce egg-production.

Investigations made in England and Germany have demonstrated the value of a vaccine prepared from pigeon pox virus for the control of fowl pox.

The author carried out comparative tests with vaccines prepared from fowl pox virus and from pigeon pox virus in order to determine their effects on egg production.

He found that fowl pox virus caused a marked fall in egg production while a high yield continued after the use of the pigeon pox virus.

JOHNSON, E. P. (1931). Results of Experiments with the Use of Pigeon-Pox Virus as Cutaneous Vaccine against Fowl-Pox.—*J. Amer. Vet. Med. Ass.* 79. 81-86. 3 figs. 2 tables. [3 refs.]

The author employed pigeon-pox virus vaccine for the immunisation of fowls; he obtained

good results as indicated by resistance to natural fowl-pox infection and sustained egg production. The virus was, however, not sufficiently potent to protect cockerels against artificial infection with fowl-pox virus.

There was a marked improvement in health of hens, affected naturally with fowl-pox, after they had been vaccinated with pigeon-pox virus vaccine.

**KLIGLER, I. J. (1931). Recovery of Fowl-Pox Virus from Vaccines by Cataphoresis.—*Brit. J. Exp. Path.* 12. 42-45. 1 fig. 1 table. [8 refs.]**

By means of cataphoresis, active fowl-pox virus was recovered at the anode from phenolised and dried fowl-pox vaccines. These vaccines which before cataphoresis did not cause an appreciable reaction when applied to scarifications on the combs of fowls, released sufficient virus at the anode to give rise to positive lesions five days after inoculation. The technique and apparatus employed are described.

**KYLASAMAIER, K. (1931). A Study on Madras Fowl Pest.—*Ind. Vet. J.* 7. 310-316. 16 figs. [5 refs.]**

The author studied a widespread virulent disease of fowls which occurred in the Madras Presidency during 1929-30.

The principal symptoms observed were dullness, whitish diarrhoea, dyspnœa, breathing through the mouth and the dribbling of ropy saliva.

The average duration of illness was about four days. Autopsy revealed congestion of the pharynx and of the alimentary tract, punctiform haemorrhages on the epicardium and proventriculus, and congestion and pin-point ulceration of the cloaca.

Microscopical and cultural examination of the organs failed to reveal the presence of demonstrable micro-organisms. Filtration experiments were not apparently carried out. A vaccine consisting of a formolised suspension of liver gave encouraging results.

Kylasamaier made comparative tests with the fowl virus and the virus of cattle plague. He found that calves were resistant to the fowl virus, but nine fowls, inoculated with cattle plague virus, all died after intervals varying from 4 to 16 days.

Anti-cattle plague immune serum did not confer protection against the fowl virus.

These results would hardly appear to justify the author's suggestion that there is a relationship between cattle plague and the avian disease.

[Madras fowl pest is probably identical with the disease described by COOPER under the name of Ranikhet disease. The virus of Ranikhet disease has been shown to be immunologically indistinguishable from that of Newcastle disease (England) described by DOYLE. Pseudo-plague (Java and Philippine Isles) appears also to be the same disease.]

**HALL, G. Norman. *Pleuro-pneumonia contagiosa bovinum*.—5th Ann. Rep. of the Vet. Lab. Vom, N. Prov., Nigeria, for the year ending 31st December, 1929. Ann. Rep. Vet. Dept. N. Prov., Nigeria, 68-74. Lagos: Govt. Printer. [5s. 6d.] [fcp.]**

No vaccine was issued in 1929. Either the indigenous cattle are very susceptible, or the indigenous strains are very virulent; a 29th sub-culture of a strain isolated from a natural case was too active for use as a vaccine. Other workers state that the virulence of the culture is fixed at the 25th generation.

As a routine procedure, it is not necessary to give a second injection to animals which fail to develop a reaction after inoculation with vaccine as only a very small percentage of such animals will react to a virulent dose.

Attempts to produce a vaccine according to the method BENNETT used in the Sudan, also with formolised cultures, formolised lymph and formolised spleen pulp, all proved unsuccessful.

The organism was readily isolated from the spleen, glands and blood of infected animals; it grew well in BENNETT's medium which is easier to prepare than MARTIN's broth.

ANCIAUX, L. (1931). Au sujet de l'effet du chlorure de calcium sur la genèse des Bactériophages. [The Effect of Calcium Chloride on the Production of Bacteriophages].—*C.R. Soc. Biol. Paris.* **106.** 489-490. [4 refs.]

The author gives a rapid survey of the ideas that have been expressed regarding the nature of bacteriophage and he emphasises the views held by certain authors as to the importance of the part played by calcium in its activity.

He has repeated PLANTUREUX's experiments, employing the latter's technique. If it were possible, by the addition of sterile calcium salts, to modify bacteria so that they regularly produce the lytic principles, it would be necessary to support the theory of bacterial autolysis produced by a ferment secreted by the bacteria themselves. The same conclusion does not, however, invariably emerge from consideration of the interesting observations made by BORDET and RENAUD, as the necessity for electrolytes for the reproduction of the lytic principles applies both to the virus and to the ferment theory.

Details are given of the tests for the presence of bacteriophage and of the manner in which cultures of strains of dysentery bacilli were put up with the addition of varying amounts of calcium chloride.

The author concludes that bacteriophage cannot be obtained with certainty by this technique.

SCHULTZ, E. W., QUIGLEY, J. S., & WOOLSEY, E. L. (1931). Studies on the Antigenic Properties of the Ultraviruses. VI. Further Observations on the Antigenic Properties of Bacteriophage.—*J. Immunol.* **20.** 149-159. [11 refs.]

The authors refer to results reported in a previous paper which may be summarised as follows:—there is a close relationship between the 'phage-antiphage reaction and toxin-antitoxin reaction; an antilytic antibody is specific and relatively thermostable and it does not fix complement nor cause specific flocculation; the reaction is influenced by time and temperature; bacteriophage suspensions inactivated by heat, trypsin and methylene blue failed to cause the production of neutralising antibodies, but formalin-inactivated suspensions retained their antigenic properties.

In the present paper experiments are described which are intended to show whether the 'phage-antiphage reaction takes place in definite proportions as claimed by OTTO and MUNTER and others, or whether, as stated by PRAUSNITZ and d'HERELLE, the course of neutralisation tends to follow a logarithmic curve. The results indicated that the neutralisation closely followed the curve of the velocity of an adsorption reaction and no evidence was obtained to indicate that it follows a logarithmic curve. Neutralisation takes place in definite proportions if the reaction is allowed to complete its course.

A second set of experiments was carried out to determine whether, as stated by ARNOLD and WEISS, bacteriophage suspensions treated with homologous sera show the Danysz-Bordet effect, as claimed by PRAUSNITZ. It was found that the Danysz-Bordet effect was produced, namely that doses of antiserum which exactly neutralise bacteriophage when added all at the same time, are not sufficient for neutralisation when added in fractions. The reaction is in the nature of an adsorption and the authors leave open the question as to whether this has any bearing on the living nature of the bacteriophage.

It was not found possible to produce dissociation in neutralised mixtures by means of physiological saline solution.

KLIGLER, I. J., & OLITZKI, L. (1931). Studies on Protein-free Suspensions of Viruses. I. The Adsorption and Elution of Bacteriophage and Fowl-pox Virus.—*Brit. J. Exp. Path.* **12.** 172-177. 6 tables. [11 refs.]

KLIGLER, I. J., OLITZKI, L., & ASCHNER, M. (1931). Studies on Protein-free Suspensions of Viruses. II. Cataphoresis Experiments with Protein-free Suspensions of a Bacteriophage and Fowl-pox Virus.—*Brit. J. Exp. Path.* **12.** 178-182. 1 table. [7 refs.]

Working with a coli-phage and fowl-pox virus, the authors were able to separate both from their associated proteins (as shown by the Esbach test) by adsorbing with kaolin and eluting the virus

from the adsorbate with ammonium hydroxide. With the phage, N/100 ammonium hydroxide was successfully employed as the eluent, but a higher concentration than N/500 was found to destroy the fowl-pox virus.

Cataphoresis experiments on these two viruses indicated that the presence of protein markedly influences the charges carried. In protein-free suspensions, the 'phage was found to be amphoteric in acid and strongly alkaline solutions and negatively charged in neutral and slightly alkaline solutions, whilst the fowl-pox virus was positive when acid, amphoteric when neutral and negative when alkaline.

NICOLLE, Charles. (1931). Sur l'origine microbienne des Agents pathogènes invisibles ou Inframicrobes. [The Microbial Origin of invisible or inframicrobial Pathogenic Agents.—*Bull. Inst. Pasteur.* 29. 209-224 & 273-280. [3 refs.]

The author has compiled evidence in support of the theory that ultravisible viruses are evolutive forms of visible micro-organisms.

The basis of his argument is that bacterial multiplication may occur, not only by simple transverse fission, but also by granule formation in which the granules produced within the organisms develop into virulent agents when freed. Work on the spirochæte of relapsing fever definitely supports this theory. Our knowledge concerning the bacillus of leprosy and the tubercle bacillus is also very favourable to this view, whilst the granular nature of the diphtheria bacillus must not be overlooked.

The author regards the bacillary form as an intermediary for reproduction by granule formation ; the granular derivatives are the virulent pathogens, whilst the bacillary forms are less virulent or non-virulent ancestral types. Viruses are considered to be the last stage of evolution in which the organism has broken completely away from its visible precursor.

This theory is used to explain the relationships of hæmolytic streptococci to scarlatina, of the influenza bacillus to influenza and of *B. proteus X 19* to the bickettsia of typhus fever, etc. The author concludes by building tentatively a genealogical tree of which the saphrophytes form the root and the viruses form the final stages of modification at the terminal branches.

TORRES, C. M. (1931). Sur la "margination" ou apposition de la basichromatine sur la membrane nucléaire, dans les inclusions intranucléaires des maladies à virus. [On the "margination" or Apposition of Basichromatine in the Nuclear Membrane in intranuclear Inclusions of Virus Diseases].—*C.R. Soc. Biol. Paris.* 106. 366-367.

A brief general discussion of the histological changes in nuclear degeneration due to virus diseases. The increase in volume of the basichromatine in the nuclear membrane, which accompanies oxychromatic degeneration in virus diseases associated with intranuclear inclusions, is generally interpreted as "margination" or apposition of nuclear basichromatine, the latter being regarded as capable of migrating and fusing with pre-existing basichromatine of the membrane.

The author regards this view as acceptable for diseases such as varicella, herpes and rabbit virus III, but has noted that in yellow fever the nuclear basichromatine is still recognisable in the linin network, even in advanced stages of oxychromatic degeneration in which increase of volume in the membrane is quite pronounced.

Studies conducted on inclusions in cases of yellow fever, especially in monkeys inoculated with the ASIBI and FRENCH virus, led to the conclusion that the increase in volume of basichromatine in the nuclear membrane was simply due to a local tumefaction of basichromatine normally present at that place. Nevertheless this does not constitute a necessary change associated with oxychromatic degeneration in virus diseases as shown by the observations of PIANESE on the nucleus of neoplastic cells.

## DISEASES CAUSED BY METAZOAN PARASITES.

SWEEBE, E. E. (1931). Common Intestinal Parasites in the Fox.—*Vet. Med.* **26.** 271-272.

The three ascarids, *Belascaris cati*, *B. marginata*, *Toxascaris limbata* and the hookworm, *Uncinaria polaris*, are mentioned in this paper. Notes are given on the damage they cause, on their life cycles and on the occurrence of prenatal infestation with ascarids ; a very heavy and fatal infestation in a five day old litter of fox pups is recorded.

Oil of chenopodium and santonin are recommended for the treatment of ascarids and tetrachlorethylene for both ascarids and hookworms, but attention is drawn to the dangers of the indiscriminate use of anthelmintics. Preventive measures which would obviate the use of these drugs are strongly recommended.

It has been found from experience that, by paying strict attention to cleanliness and by treating all the mature foxes prior to the breeding season, infestation of the pups may usually be avoided.

KUERSCHNER. (1931). Die Bekämpfung der Dasselfliege. [The Control of Ox Warble Flies (*Hypoderma bovis*)].—*Munch. tierärztl. Wschr.* **82.** 241-245.

An account of a conference convened in Berlin on 18th April, 1931, by the Reich's Ministry of Food and Agriculture, the author being in the chair. DIETRICH read a paper describing the scientific aspect of the question and also its legal side in the light of regulations and enactments passed by various provincial governments. Other members of the conference took part in the discussion that followed and reported on the efficacy and comparative value of different agents, including patent remedies, tested in the field in Germany : these included "Delicia I and II," "Flit," "Dasselstäbchen E," "Derrys root," "Pycocotin," "Schmierseife," "Larfugsalbe" and others. Good results were reported with "Delicia II" and "Dasselstäbchen E," particularly when animals were clipped prior to treatment. Compulsory reporting by owners in cases of heavy infestation is advocated. It is suggested that pamphlets should be distributed and lectures given to livestock owners. A special commission has been elected to prepare a report on the control of warbles in the Reich.

KRIJGSMAN, B. J., & WINDRED, G. L. (1931). Physiologisch-Oecologische Onderzoeken over *Lyperosia exigua*. Dell 1. De relatie tusschen de volwassen *Lyperosia* en zoogdier fæces. [Physiological-Ecological Investigations regarding *Lyperosia exigua*. Part 1. The Relationship between adult *Lyperosia* and Mammalian Fæces].—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 113-131. 2 figs. [17 refs.]

The authors' investigations into certain of the bionomical characters of *Lyperosia* are of importance because of the help they afford in the framing of regulations for the control of the fly. In certain areas in Australia *Lyperosia* is an actual plague.

In another paper [*Ned.-Indisch. Blad. v. Diergeneesk.* **42.** Pt. II. 110-120] the authors have dealt with the question of "host-preference" of the fly and they promise a further publication on the development of the fly in certain media.

In the present communication, they deal with the reactions shown by *Lyperosia* in the presence of the fæces of different species of mammals.

They made observations regarding the selection of the kind of fæces by the fly, the attraction of the fæces for the two sexes and the behaviour of the females when on the fæces.

*Lyperosia* is able to differentiate between buffalo, cow and horse dung and its preference for them runs in that order. Dog fæces are not attractive. The attraction is probably related to the distinctive odours and as the fæces become stale their attraction is lost. The female flies are more strongly attracted than the males.

There is no evidence that the fæces provide any definite stimulus to oviposition.

I. PILLERS, A. W. N. (1931). Notes on Parasites in 1930.—*Vet. Rec.* **11**. 668-670. 1 table.  
 II. MCGAUGHEY, J. (1931). So-called *Ascaris ovis* in Lamb's Liver.—*Vet. Rec.* **11**. 674.

I. This is the author's annual report on the various parasites that have been received by him for identification during 1930. A list is given of the 62 different species encountered, together with notes on certain points of interest.

Among the more interesting finds may be mentioned a species of *Cyathostoma* in the jungle fowl in Ireland, *Oslerus osleri* in the dog in London and the eggs of *Ancylostoma caninum* in dog's faeces in Staffordshire.

II. The finding of an *Ascaris* in one of the bile ducts of a lamb's liver is here recorded and attention is called to the rarity of the occurrence.

KERSTENS, C. J. A. (1931). Cysticercose. [Cysticercosis.]—*Tijdschr. Diergeneesk.* **58**. 697-698.

Although *Cysticercus inermis* has been found in Holland, no record of *C. cellulosae* has yet been made.

The author believes that he has recognised it in a lesion in a pig's heart. The parasite seen was, however, in a degenerated condition.

HOOGLAND, H. J. M. (1931). Een Geval van Pancreas-Distomatose bij de Kat. [A Case of Distomatosis of the Pancreas in a Cat.]—*Tijdschr. Diergeneesk.* **58**. 457-467. 4 text figs.

The author describes extensive infestation of a cat in Holland with *Opistorchis felineus* and *Metorchis truncatus*. He gives a brief review of the literature of the subject and describes the macroscopic and microscopical characters of the lesions found.

The parenchymotous changes in the pancreas were more extensive than those in the liver.

LEIMER, D. (1931). Zur Bekämpfung der Eingeweiderwurmer bei Pferden. [On the Control of Intestinal Worms in Horses].—*Tierärztl. Rdsch.* **37**. 44.

The author discusses briefly the principles underlying the use of anthelmintics for strongylidosis in equines. The preparations of a particular firm are specially mentioned, but their composition is not given.

CANAVAN, W. P. N. (1931). Nematode Parasites of Vertebrates in the Philadelphia Zoological Garden and Vicinity. II.—*Parasitology*. **23**. 196-229. 25 figs. 6 tables. [32 refs.]

This paper, which is the second part of the report, is chiefly of interest to systematists. One new genus and five new species are described and several new hosts are recorded for known species. A new species of *Oesophagostomum* is described in the camel and named *O. vigintemembrum*; it is differentiated from *O. venulosum* by the possession of 20 elements in the internal leaf crown and cervical papillæ level with the oesophageal connection to the intestine.

Adult forms of *Eustrongylides weurichi* were found in the Canadian goose and pre-adult forms in the Congo eel and in a fish. This strengthens the supposition that fish serve as the intermediate host for this genus.

*Cyathostoma americanum* is reported in the "bobwhite" quail *Colinus virginianus*.

BOGDASCHEN, N. (1931). Ueber die Verbreitung von *Pentastomum denticulata* in den Mesenteriallympknoten des Schafes in der Sowjetunion. [On the Distribution of *P. denticulata* in the Mesenteric Lymphatic Glands of Sheep in Russia].—*Tierärztl. Rdsch.* **37**. 401-403. 1 table. [1 ref.]

In 1927 BUGGE stated that the great majority of the nodules in the mesenteric lymphatic glands of cattle arriving at the Berlin abattoirs are caused by immature forms of *Fasciola hepatica* and

not by *Pentastomum denticulatum*. This statement led the author to investigate the cause of the condition in cattle at the Leningrad abattoirs and he found that 90.45 per cent. were infested with *Pentastomum denticulatum*.

He also carried out examinations for these parasites in sheep, but found only 18.73 per cent. of 331 sheep to be infected. A description of the author's technique is given together with a table showing detailed results of the examinations.

STOCKMAYER, W. (1931). Erkrankungen und Todesfälle bei Affen infolge von Oesophagostomiasis intestini. [Illness and Death in Monkeys caused by Intestinal Oesophagostomiasis].—*Zeitschr. Infektkr.* 39. 70-76. [11 refs.]

The author found *Oesophagostomum apistostomum* Willach in nine out of 16 rhesus monkeys he examined. Fatal peritonitis occurred in three of these animals and sexually mature forms of the parasite were found free in the abdominal cavity. There were perforations of the intestinal wall at the sites at which nodules containing the parasites were situated.

CARNE, H. R., & ROSS, I. C. (1931). The Association of the Bacillus of Preisz-Nocard with Lesions caused by *Oesophagostomum columbianum* in Sheep.—*J. Sci. & Indust. Res. Australia.* 4. 78-80. 1 table.

In the past, there has been some confusion as to whether certain lymph gland lesions in sheep infested with this worm are due to its larval forms or to the Preisz-Nocard bacillus. European workers have drawn attention to the fact that the presence of worms in the alimentary tract may possibly facilitate infection by bacteria.

The authors investigated the question. They administered cultures of the bacillus along with larval worms—chiefly oesophagostomes—to 5 four months old lambs, culture alone to two lambs and larval worms alone to two other lambs. They gave different doses to the individuals in each group.

At autopsy, 37-57 days after the beginning of the experiment, lesions due to oesophagostome larvæ were present in all the sheep that had been dosed with these worms. On the other hand, only three out of the five lambs which were also dosed with the Preisz-Nocard bacillus showed any lesions of caseous lymphadenitis and the lesions were only present in the region of the alimentary tract of one of the three. The lesions in the other two infected sheep were in the submaxillary region and this was ascribed to direct infection through the mouth or throat.

Lesions developed in the mesenteric lymph glands in four of the five sheep dosed with worms and bacilli; these lesions were found to be caused by the worm larvæ and they resembled lesions of caseous lymphadenitis.

This experiment supports the views of several Australian workers that the lymph glands draining the alimentary tract are frequently the seat of lesions caused by larval oesophagostomes and it also indicates that the co-existence of these worms and bacteria in the intestine does not much favour the entrance of the latter to the intestinal system.

It follows that *Oesophagostomum* infestation has little significance in the control of caseous lymphadenitis.

LANE, Clayton. (1931). The Mechanism of Microfilarial Periodicity.—*Lancet.* 220. 1100-1101. [6 refs.]

This problem was discussed by the author in a paper published in 1929. In that paper, the various theories which have been put forward to explain the phenomenon of microfilarial periodicity were considered and all were found to be untenable, except the one which presupposes that the female *F. bancrofti* produces microfilariae only at night and that the microfilariae are able to live in the blood stream for a few hours only.

The present paper calls attention to an observation made by MANSON-BAHR and to histological studies recently made by O'CONNOR on infected tissue from subjects who had died at a known time

of day. Both of these contributions supply some new evidence in support of this theory which appears to provide the most probable explanation of the mechanism of microfilarial periodicity.

NAGATY, H. F. (1931). **On the Identity of *Trichostrongylus axeii* (Cobbald, 1879) Railliet and Henry, 1909 and *T. extenuatus* (Railliet, 1898) Ransom, 1907.**—*Ann. Trop. Med. Parasit.* 25. 107-121. 11 text figs. 1 table. [20 refs.]

The author reviews the literature dealing with *T. axeii* as a separate species from *T. extenuatus* and as a factor in disease production. COBBOLD's original description of *T. axeii* is the only one in existence and is inadequate for purposes of classification at the present time; there appears to be nothing in the descriptions of *T. extenuatus* which would suggest that it is a separate species. The author had a plentiful supply of good material from a goat, a sheep, an ox and two horses and, after a careful study of this, concluded that all the specimens from these various hosts were referable to a single species. *Trichostrongylus extenuatus* (Railliet, 1898) therefore falls as a synonym of *Trichostrongylus axeii* (Cobbald, 1879) which the author redescribes from his material.

PENSO, G., & ALVARADO, C. (1931). Sugli Sclerostomi del cavallo. [The Sclerostomes of the Horse].—*Clin. Vet. Milano.* 54. 325-343. 5 figs. [9 refs.]

The larvæ of sclerostomes are able to develop in a medium which is rich in bacteria and protozoa, even when it is in a state of putrefaction. The authors find that the larvæ are able to penetrate the roots and stems of plants which offer conditions favourable to their development. Two figures are given to support this statement. It is possible that horses which have not acquired the infection in the usual way—that is to say by the coronets—may become infected through the buccal mucous membrane by the larvæ present in fresh forage.

In *Sclerostomum equinum* the orifice of the dorsal œsophageal gland opens at the extremity of the styloid tooth and not at the extremity of the dorsal rib as in the other two species.

*Sclerostomum equinum* is also peculiar in that the orifice of the duct of the œsophageal gland is ventral.

#### DISEASES, GENERAL.

WILLIAMS, W. L. (1931). **Studies in Teratology.**—*Cornell Vet.* 21. 25-56. 27 figs. [9 refs.]

Records show a preponderance of monsters in cattle, especially in dairy cattle. Out of 17 cases described in detail by the author, 15 were of bovine, one of ovine and one of porcine origin. He ascribes this predominance in the bovine species to the culminating effect of heavy reproductive demand, artificial housing and feeding, the improper rearing of dairy calves and an extra susceptibility to genital disease. Calves are frequently debilitated by disease whilst attaining sexual maturity and are bred from before their reproductive organs can properly respond to the demand made on their strength.

VIANELLO, G. (1931). La localizzazione articolare della setticemia diplococcica dei Vitelli. [The Localisation of Diplococcic Septicæmia in the Joints of Calves].—*Clin. Vet. Milano.* 54. 356-359. [8 refs.]

Diplococcic septicæmia of calves is a sporadic disease which does not produce a very high mortality. It attacks calves during the first weeks of their lives and is characterised by an intense diarrhoea, mixed with blood in some cases. There is high fever and, in fatal cases, death takes place within about 48 hours after the onset of the disease. Subcapsular haemorrhages and enlargement of the spleen which is "gummy" in consistence are characteristic features of the disease; the "gummy" condition of the spleen is due to the deposition of fibrin along the trabeculae. There is marked congestion of the intestines and this is accompanied by haemorrhage in some cases.

The author records the occurrence of the disease in animals about a week old, the joints especially being affected. These cases in very young animals showed the ordinary symptoms in addition, and many of them terminated fatally within a week.

The joints showed oedema and vascular congestion of the periarticular tissues, and the joint cavities contained an excess of reddish, turbid fluid with flocculi of fibrin.

Lancet-shaped cocci were present in materials from the joints and spleen. Rabbits inoculated intraperitoneally with material from the lesions died of septicæmia in 12-18 hours. Mice died in 2-3 days. Guinea pigs survived about a week and then died of a sub-acute peritonitis.

UDALL, D. H. (1931). **Diseases of the Newborn Calf.**—*Vet. Med.* **26.** 278-280.

The author recognises three groups of calf diseases:—(1) septicæmia, white scours and navel ill; (2) pneumonia; and (3) poisoning. Exposure aggravates the incidence of the diseases of the first group. Pneumonia usually occurs in the second month of life and is generally fatal. Lead poisoning is very apt to occur if calves are allowed access to painted objects. The toxic dose of lead for calves is very small and the true cause of death often escapes detection.

RANKIN, J. F. (1931). **Sterility in Cows caused by Endometritis.**—*J. Amer. Vet. Med. Ass.* **78.** 777-781.

KINGMAN, H. E. (1931). **Endocervicitis in the Cow.**—*J. Amer. Vet. Med. Ass.* **78.** 782-792.

Both papers deal with the clinical aspects of the question. A discussion followed at the meeting at which they were presented.

CONKLIN, R. L., McCARTHY, J. B., THOMPSON, R. R., & PUGSLEY, L. I. (1931). **Clinical, Bacteriological and Physio-Chemical Studies of the Pregnant Bovine Uterus.**—*Cornell Vet.* **21.** 177-187. 5 tables. [22 refs.]

The authors studied the following aspects of the question:—the determination of the bacterial flora of the pregnant bovine uterus; the changes in the reaction of the amniotic fluid in clinically healthy animals and in various types of infection; the isolation of organisms present in the genital tracts of the above animals and the testing of their pathogenicity for the genital tracts of experimental animals; and the question of whether any individuals of the bacterial flora produce such changes in the tissues and fluids as to render them suitable for the growth of *Br. abortus*.

They carried out a bacteriological examination of 80 uteri; 71 of them contained bacteria belonging to 17 genera according to the Bergey classification; infection was sometimes found in the utero-chorionic space and sometimes in the amniotic fluid and, in most cases, in both situations simultaneously.

When the amniotic fluid was acid, the bacteria isolated from it were capable of forming acid from sugars and milk. When the density and the nitrogen content were high, the bacterial content was high.

The amniotic fluid was normal in all sterile uteri. *Br. abortus* was always accompanied by other organisms. Certain organisms appear to alter the pH of the tissues and fluids and to render them suitable for the growth of *Br. abortus*.

The pH of the amniotic fluid from diseased animals varied; it was below the normal of 6.85 in some cases and above it in others. In healthy animals, the calcium-phosphorus ratio of the amniotic fluid decreased as pregnancy advanced, whereas it increased when disease was present. The potassium-phosphorus ratio did not differ appreciably in the fluid of normal and diseased animals.

Details are given, largely in tables, and certain literature on amniotic fluid is briefly reviewed.

LEGORI, E. (1931). **Contributi sperimentalii alla cura della sterilità dei bovini. [Experimental Contribution to the Treatment of Sterility in Bovines].**—*Clin. Vet. Milano.* **54.** 47-53.

The author finds that sterility is most frequently associated with either contagious abortion

or granular vaginitis. In some cases, he believes that persistence of *corpora lutea* plays a part. For the latter condition he practices manipulation of the ovary, but in those cases in which some infective condition of the vagina, cervix or uterus is the cause, he irrigates with a weak solution of iodine.

SCHOETTLER, F. (1931). Ueber veterinärpolizeilich wichtige Zoonosen. [The Diseases of Animals communicable to Man important from the Veterinary Police Point of View].—*Berl. tierärztl. Wschr.* 47. 273-280. [79 refs.]

An address delivered by the author at the Berlin veterinary college in which he reviews our present knowledge regarding most of the important animal diseases transmissible to man.

MIESSNER, H. (1931). Schädigung der Tierwelt durch Industrie und Technik. [Danger to Animals from Industrial Sources].—*Deuts. tierärztl. Wschr.* 39. 340-345. 1 table. [26 refs.]

THE SMOKE OF FOUNDRIES.—Sulphur dioxide and arsenious acid are given off in appreciable quantities from such smoke and are spread over large stretches of land by changing winds. Certain areas in industrial Germany are well known to be dangerous to animals on this account. These two main noxious substances vary in proportion in different metallic ores and with methods of smelting.

Rain causes the deposition of sulphurous acid near the foundry and, under suitable conditions, arsenious acid forms a fine dust ("Flugstaub"). Affected land is markedly acid and plants growing on it, although normal in protein and fats, are deficient in phosphorus, calcium and magnesium.

Animal production is seriously affected under such conditions and, in certain districts, is impossible. Animals do not thrive on such land ; they tend to become sterile and, owing to excessive calcium excretion, osteomalacia is common. Miessner considers that the onset of lead poisoning is an overrated sequel to exposure to foundry smoke, that lead is present only in small quantities in the smoke and that, in the form in which it occurs, it is rather insoluble. He discusses the effects of arsenical poisoning.

Hydrofluoric acid is emitted from artificial manure factories. It damages the herbage and affected grass has a yellow and frost-bitten appearance ; calcium is withdrawn from the bones of animals existing on such fodder.

The author discusses the fog in the Meuse valley which was related to the industrial fumes and caused asthma, bronchitis, and heart disease [see this *Bulletin* 1. 176]. In Westphalia and elsewhere cases have been reported of severe respiratory disease in cows subjected to thick fog when pastured on aftermath.

LEAD POISONING.—Lead dust was conveyed for many years from mines by open streams rising in the Harz mountains. Water from these streams made the surrounding land very dangerous for animals and lead poisoning was common in cattle ; the severe nervous type of illness is known locally as "Jammer-" or "Haukrankheit." Affected horses suffer from respiratory trouble and whistling. If plant food is well washed, the lead is removed. According to Miessner's experience, litharge is more toxic than pure lead, lead sulphide or sulphate. Horses are less susceptible to lead poisoning than cattle. A few cases are quoted.

THE DANGERS OF TANNERIES.—Anthrax is not infrequently introduced by dried hides imported into Germany : it was found in 0.28 per cent. of hides taken over a period of six years by a certain tannery. The Ascoli precipitation reaction is used for diagnostic purposes, but it is apparently not absolutely reliable.

Reference is also made to water-borne diseases, including sewage poisoning, and to food poisoning in animals caused by the adulteration of concentrate foodstuffs by castor beans after extraction of the oil. Soya bean poisoning is also referred to.

KROON, H. M., & PLANK, G. M. van der. (1931). Enkele sub-letaalfactoren bij Huisdieren in Nederland. [Some sub-lethal Factors in domesticated Animals in Holland].—*Tijdschr. Diergeneesk.* 58. 681-694. 5 text figs. [18 refs.]

The author has studied four sub-lethal factors :—albinism and congenital imperfect epithelium

formation in bovines, the factor concerning defective limb development in sheep and the occurrence of dwarfs in Friesian horses.

All these factors could be brought out by in-breeding. The most complete study was that concerning the last named ; 26 dwarf foals could be traced.

KFOURI, Philippe. (1931). Étude de la sensibilité broncho-pulmonaire du cheval à divers agents pathogènes des voies respiratoires de l'homme. [Study of the Sensitiveness of the Broncho-Pulmonary Tract of the Horse to various Pathogenic Agents from the Respiratory Tract of Man].—*Rev. Path. comp.* 31. 465-477. [4 refs.]

KFOURI, P. (1931). Recherches sur la sensibilité broncho-pulmonaire du cheval aux pneumocoques type 1, type 2, type 3, d'origine humaine. [Researches on the Broncho-pulmonary Sensitiveness of the Horse to Human Pneumococcal Types 1, 2 and 3].—*Rev. Path. comp.* 31. 545-559. [4 refs.]

The author has carried out a number of experiments to determine whether certain bacteria of pathogenic significance, obtained from the human respiratory tract, are virulent for the horse when inoculated by the intra-bronchial route.

He found that the colon bacillus, the enterococcus and the bacillus of influenza did not give rise to appreciable illness, but the first inoculation with a mixture of all three types of pneumococci resulted in an acute lobar pneumonia. Spontaneous recovery occurred and further inoculations during convalescence showed that a degree of immunity had been obtained. Pneumococcus type 2 was found to be only slightly virulent and did not confer immunity against types 1 and 3.

MCMEE, J. W. (1931). The Spleen: its Structure, Functions, and Diseases.—*Lancet*. 220. 951-957, 1009-1014 & 1063-1070. 18 figs. [118 refs.]

ANNOTATION. (1931). Splenic Functions and Diseases.—*Ibid.* 220. 1091-1092.

An account of these lectures which appeared in the *British Medical Journal* of March 7th, 1931, is noted in this *Bulletin*, Vol. I, No. 2, p. 163. They are given *in extenso* in the *Lancet (supra)*.

WIRTH, D., & POMMER, A. (1931). Akropachie beim Pferde. [Acropachia in the Horse].—*Arch. wiss. prakt. Tierhik.* 63. 280-288. 8 figs. [14 refs.]

This is a report of a case of acropachia in a light draught horse which remained in poor condition in spite of good feeding. Swellings which were hard and practically painless appeared directly above and below the hock joints and, about a month later, similar swellings appeared in the regions of the carpus on both sides. No other abnormalities were found in the course of systematic examinations.

X-Ray examination of the limbs showed extensive exostoses on both tibiæ, the ossa calcis, the metatarsal bones of both hind limbs and on both the radii and metacarpi. The condition was one of chronic periostitis of the bones immediately adjacent to the joints ; those parts of the bones enclosed in joint capsules did not participate in the change.

In view of the results of tuberculin tests, a tentative diagnosis of tuberculosis was made and the horse was destroyed. There were no tuberculous lesions and the biological test yielded negative results. The cause of the condition was not discovered.

The author reviews the available literature on acropachia in domestic animals ; it usually occurs secondarily to pulmonary tuberculosis or to other lung disease.

GRAF, H. (1931). Beiträge zur physikalischen Harnchemie der Hunde mit besonderer Berücksichtigung der Hautkrankheiten. [Contributions to the Physical Chemistry of Urine with Special Reference to Skin Diseases of Dogs].—*Tierärztl. Rdsch.* 37. 214-216. [5 refs.]

This, a second paper of the series, has the sub-heading 2. Relationship between density, viscosity

and surface tension, in presence of sugar and acetone. The observations of JOEL [Biochem. Zeitschr. (1921). 119. 93.] on the human subject form the starting point for the author's work on dogs. Three tables and two graphs are given, covering normal dog urine with added sugar, and several pathological urines. Determinations are made of specific gravity, viscosity and surface tension, (expressed in dynes per cm. and in Gh-E or Graham units) with varying quantities of sugar and acetone.

The general results show that in dogs suffering from skin diseases, with or without nephritis, the viscosity of the urine rises proportionately with the sugar while the surface tension alters very little. Acetone reduces the specific gravity but raises the viscosity and surface tension very markedly. In the presence of both acetone and sugar, the acetone restricts the rise of sp. gr. due to the sugar, the viscosity is greater than with either alone and the influence of the acetone on the surface tension is very pronounced. With initially high density of urine, the influence of the acetone on the sp. gr. is small. A diabetic urine (6-7 per cent. sugar) showed low surface tension (10-18 Gh-E), but high viscosity.

GRAF, H. (1931). Beiträge zur physikalischen Harnchemie beim Hunde mit besonderer Berücksichtigung der Hautkrankheiten. [Contributions to the Physical Chemistry of Urine with special reference to Skin Diseases of Dogs].—Tierärztl. Rdsch. 37. 365-367. 1 table, [8 refs.]

The sub-heading of this paper is 3. *The Stalagmometric and Acid Quotient of Schemensky*; the article, therefore, requires comparison with the paper by the same author [Tierärztl. Rdsch. (1931). 37. 13.] and with the earlier article by SCHEMENSKY [Biochem. Zeitschr. (1920). 105. 237.]

The "stalagmometric quotient" is based upon comparison of the number of drops of urine flowing through the stalagmometer orifice with the number of drops which flow after shaking with animal charcoal and filtering, the urine being first diluted to a standard sp. gr. of 1010 (with distilled water). Increase in the normal value indicates decrease of surface tension. The relation between the rate of dropping at fixed pH of urine direct, and of urine after shaking with animal charcoal, was termed the "acid quotient." These quotients considered the capacity for adsorption of those urinary constituents most active in influencing surface tension, and the presence of albumen of pathological urines. The pH corresponded to the turning point of Congo Red and thus lay at about 3.5.

The author varies the technique by using Norit in place of charcoal (as adsorptive agent) and by adjusting the reaction (with H Cl) to pH 4 by the usual indicator methods.

In recording the quotient only the decimal figures are used; e.g. a ratio of 1.135 to 1 is written 135. For urine of healthy human subjects the "stalagmometric quotient" is below 100 and the "acid quotient" below 200. SCHEMENSKY's data showed high values (150-170, and 188-372, respectively) for nephritic urine containing albumen.

The author finds his own data on dogs in general agreement with SCHEMENSKY's data on the human subject. With morning urines of dogs suffering from skin disease (eczema), the stalagmometric quotient ranged 40-82 and the acid quotient 108-239, when sp. gr., cytological appearance, and chemical reactions, were normal. In the presence of albumen and cell sediments, however, both quotients were considerably raised (e.g. 315 for acid quotient).

In the tabular statement of results, viscosity, pH, sp. gr., chemical and microscopic findings of the urines are also recorded.

KLARENBEK, A. (1931). Nieuwere Inzichten in het Onstaan van de Angstneurose der Honden. [New Ideas regarding the Causation of Canine Hysteria].—Tijdschr. Diergenesk. 58. 33-40.

The author claims that he produced canine hysteria with certainty by feeding dogs on a particular type of dog biscuit. He admits the possibility that such foodstuffs may not be the only cause of the condition; intestinal parasites may possibly be a cause. He believes, however, that the disease is probably due to some unknown substance in the food.

No details are given of any experiments and the paper is mainly speculative.

DUDGEON, Leonard S., & GOADBY, H. K. (1931). The Examination of the Tissues and some Observations on the Blood Platelets of Rabbits at Intervals of five Minutes and later, after intravenous Inoculations of *Staphylococcus aureus* and Indian Ink.—*J. Hyg. Camb.* 31. 247-256. 3 plates. [28 refs.]

The authors found that the immediate result of injecting any particles into the circulation was the congregation of polymorphs in the lung capillaries. Inert bodies, such as Indian ink particles, aggregate with the blood platelets and adhere chiefly to the walls of the lung capillaries, some passing later to the liver and spleen sinuses where they are taken up by the endothelial cells. There is very little phagocytosis by the polymorphs; a temporary fall in the blood platelet count is probably mechanical and not due to actual loss or destruction.

The same phenomena follow the inoculation of dead or living staphylococci, except that polymorph phagocytosis is immediate and marked and that some blood platelets appear to be permanently removed from the circulation. The Kupfer cells in the liver exert a phagocytic action on the cocc.

—. (1931). Report of the Committee of the American Veterinary Medical Association on Transmissible Diseases of Poultry.—*J. Amer. Vet. Med. Ass.* 78. 445-448.

A contribution designed to enlist the interest of general practitioners in poultry work. The Committee recommends that all veterinary colleges should introduce courses in poultry hygiene and pathology and hold conferences and short post-graduate courses in poultry diseases.

It considers that "extension veterinarians" should be required to make poultry work part of their programme; that veterinary organisations should emphasise the importance of this subject in their meetings and that all state and federal sanitary authorities should instruct their field agents to educate poultry owners in hygiene, etc.

LUDFORD, R. J. (1931). Resistance to the Growth of Transplantable Tumours. I. The Influence of Vital Staining on induced Resistance.—*Brit. J. Exp. Path.* 12. 45-49. 2 figs. [4 refs.]

LUDFORD, R. J. (1931). Resistance to the Growth of Transplantable Tumours. II. The Influence of Dyestuffs and of Colloids on Natural Resistance.—*Brit. J. Exp. Path.* 12. 108-113. 3 figs. [5 refs.]

The author has shown that the immunity conferred against transplantable tumours in mice by the injection of embryo-tissue emulsions can be broken down by a process of vital staining with trypan blue. Furthermore, using tumours which tend to regress or to be resisted by the mice, he has shown that vital staining by this and other acid dyes or the intravenous injection of inorganic colloids, lowers the resistance of mice to the tumour transplants. Both types of substance employed were eliminated by the macrophages in the body and both were used at the limit of toxicity.

PIRIE, Antoinette, & HOLMES, Barbara Elisabeth. (1931). The Cause of Inactivation of the Rous Sarcoma Filtrate during Incubation.—*Brit. J. Exp. Path.* 12. 127-133. 5 tables. [9 refs.]

The authors carried out a number of experiments, the results of which indicate that inactivation of the filtrates is a process of oxidation rather than one of proteolytic change. Owing to their inhibition of oxidation, cysteine and sodium hydrosulphite exerted a preserving action under anaerobic conditions, but in the presence of air they rapidly destroyed the filtrates. Methylene blue similarly destroyed the filtrates.

There was evidence to show that partial re-activation occurred following the use, after oxidation, of reducing agents such as the cobalt-cysteine system.

GYE, W. E. (1931). A Note on the Propagation of Fujinami's Fowl Myxosarcoma in Ducks.—*Brit. J. Exp. Path.* 12. 93-97. [3 refs.]

FUJINAMI and HATANO have reported the propagation of a fowl myxosarcoma in ducks for

40 generations. Using a sample of their tumour, the author has confirmed their findings by inoculation experiments with both chickens and ducklings.

In his experiments, he found that the tumour regressed in certain breeds of ducks (a fact not observed in the fowl) and that metastases never occurred in the duck. The power of growth in the duck is apparently due to the adaptation of a cell-free filtrate to the duck cells, not to multiplication of chicken cancer cells in duck tissues. Further evidence in favour of the "virus" theory is that the ducklings commonly died 8-10 days after inoculation, possibly as a result of toxæmia from the rapidly-growing tumour.

## DISEASES RELATED TO NUTRITIONAL AND METABOLIC FACTORS.

CARLSTRÖM, B. (1930). Ueber die Aetiologie und Pathogenese der Kreuzlähme des Pferdes. [Etiology and Pathogenesis of Equine *Hæmoglobinæmia paralytica*].—Monograph format. Berlin : de Gruyter & Co. 1-182. 16 text figures. 3 tables. [5 pages of refs., 178-182.]

CARLSTRÖM, B. (1931). Ueber die Aetiologie und Pathogenese der Kreuzlahme des Pferdes. [Etiology and Pathogenesis of Equine *Hæmoglobinæmia paralytica*].—*Skand. Archiv f. Physiol.* Parts I, II, & III. 61. 161-224 and Part IV. 62. 1-69. Part V in press.

The monograph form, with references arranged according to pagination 1-178, would seem to have been prepared by slight alteration of printer's proofs of the serial article in the journal cited. The complete monograph is dated 1930, but the cover bears the impress *Skandinavisches Archiv für Physiologie* although the final portion (Part V) has still to appear.

Anyone concerned with the investigation of *Hæmoglobinæmia paralytica* will find this comprehensive article an indispensable source of information, since it not only provides a critical review of all the available literature, but adds a great deal of important new experimental observations, using modern biochemical and physiological technique. It emanates from the veterinary medical department of the veterinary college at Stockholm but a portion of the work was executed with HENRIQUES, head of the medical-physiological institution at Copenhagen, during the tenure of a Rockefeller scholarship.

It is impossible to do full justice to the publication in a brief abstract, but a general survey will indicate its character.

Amongst other names the disease, "Kreuzlähme," passes in the literature as *Hæmoglobinæmia paralytica* (HUTYRA-MAREK), *Lumbago* (DIECKERHOFF), *Azoturia* (WILLIAMS), *Hæmoglobinæmia rheumatica* (FROHNER), and *Hæmoglobinurie paroxystique à frigore du cheval* (LUCET). The author shows that the so-called "hæmoglobinuria" does not arise from hæmoglobin but from myoglobin and, therefore, (p. 64) suggests *Myoglobinuria paralytica* as being a more appropriate name.

Although the disease is generally regarded as peculiar to horses, scattered references occur in the literature to occasional cases of similar maladies in other animals. The author does not regard the description of cases in cattle and dogs as convincing, but he himself observed a case in a donkey and is prepared to accept JOHNE's description of a case in a zebra as sufficiently close to warrant consideration of the disease as "peculiar to the equidæ." It is treated as world-wide in distribution, but generally confined to equines used for hard work and even then is limited by definite predisposing factors and individual susceptibility. The usual conditions for its occurrence are return to muscular work after a few days rest on abundant food, especially food rich in carbohydrate (CARLSTRÖM), which encourages glycogen storage in the resting muscles.

The disease is characterised by sudden loss of motor function, generally localised in the hind limbs and it is usually accompanied by so-called hæmoglobinuria (myoglobinuria), profuse sweating and certain degenerative changes in the more seriously affected muscles.

With regard to the period of rest and high feeding, the author analyses the statistics over the years 1919-1930 from the Stockholm Veterinary Clinic (p. 184). These show dominant occurrence of the disease after 2-4 days rest (103 cases), but occasional appearance in from one day (nine cases) up to 14 days (five cases over 9-14 days). The mortality incidence is high; 50 out of 103 cases, or 48 per cent., for the "typical interval outbreaks,"

On pp. 27-63, the earlier theories of causation are discussed, special attention being paid to the work of LUCET and of BRUN during the 1907 strike on the Paris tramway system. During this strike (Jan. 22nd to Feb. 6th) 600 horses were unconscious participants, and resulting cases of "Kreuzlähme" provided evidence which the author turns to good account in his discussion. These horses were stalled in two stables, 200 in one and 400 in the other. The working ration, expressed in kilograms, was 4 maize, 2 oats, 0.5 beans, 1.5 molasses, 5 straw and 2½ hay; the molasses being reduced somewhat and the hay raised during the resting period. The significant point was that, in the group subjected to very little exercise (only 15 minutes slow walk per day), cases were numerous, while in the other, sent out on a daily trot of several kilometres, practically no cases occurred (p. 14).

The predisposing factors were obviously muscular inactivity and high feeding on carbohydrate-rich food (molasses, maize).

The various earlier theories, involving the influence of cold as an exciting cause, the presence of infection (*Streptococcus melanogenes* of SCHLEGEI), the probability of intoxication or auto-intoxication, alteration of protein metabolism (increase of urea elimination contended by WILLIAMS in assigning the name *Azoturia*, but combated by M'FADYAN, 1888) are all dismissed by the author before propounding his own view. The recent views of HOBMAIER (1928), are accorded full consideration, not so much on the grounds that they are well supported by experimental evidence, but rather in virtue of their originality. HOBMAIER put forward the idea of a "toxic allergen" in the food (contained in oats, rye and other food stuffs, analogous to the toxic protein of *Vicia sativa*) operating by sensitisation through injured portions of the alimentary tract. Once animals were sensitised, the period of rest and high feeding was supposed to result in an accumulation of split products of proteins "foreign to the blood," beyond the detoxicating capacity of the liver, so that any exciting cause (work, cold, exposure) could precipitate a form of anaphylactic shock. The author, however, dismisses HOBMAIER's theory on the grounds that feeding experiments (even with *Vicia sativa*) failed to produce the disease and that the more prominent symptoms of anaphylactic shock in the horse (leucocytosis, mydriasis, inspiratory dyspnoea, increased peristalsis, fibrillary muscular twitchings) are not those characteristic of "Kreuzlähme."

More attention is paid to the views of HERTHA, and of WESTER (1921), which involve consideration of excessive production of lactic acid during work, in consequence of excessive storage of muscle glycogen during rest.

Consideration of such factors may be regarded as forming the starting point for the author's own investigations which may be summarised as follows:—

(1) Comparative studies on the blood (taken from the jugular vein) of healthy and of affected horses in respect to haemoglobin (Haldane method), cell volume (haematocrite), osmotic resistance of erythrocytes (Meulengracht-Hamburger method), dry matter of plasma, bile pigments in plasma (Herzfeld modification of van den Bergh method) and blood pigments in plasma (spectrophotometer);

(2) Comparative studies of muscular tissue (individual muscles studied by excising small portions under narcosis and dropping into liquid air to inhibit chemical changes) in respect to glycogen content and lactic acid production;

(3) Comparative study spectoscopically, and by injection experiments using normal horses, of blood pigments (haemoglobin) and muscle pigments (myoglobin);

(4) Studies of the urine in respect to pigmentation;

(5) Miscellaneous additional analyses including determination of creatin, amino-acids, "rest nitrogen," calcium, inorganic phosphorus, and pH;

(6) Experiments on the production of the disease by reproducing the predisposing factors (work, rest, high carbohydrate diet);

(7) Experiments on reproduction of local muscular symptoms by blocking the capillary circulation with minute emboli (intra-arterial injection of suspensions of *Lycopodium* in saline and of starch granules).

Amongst other results, the author finds that normal horse plasma is always free from blood pigment and that, even when the urine is strongly coloured in pronounced cases of the disease, the plasma pigmentation is surprisingly small. Although readily detectable by the spectroscope it only shows as "visibly red" in exceptional cases. The urinary pigment is regarded as a derivative of myoglobin and not of haemoglobin and it is shown that injections of the former pigment into the

circulation can produce pigmented urine without marked pigmentation of plasma. On the other hand, haemolysed erythrocytes could be injected in amounts sufficient to produce visible haemoglobinæmia without producing appreciable myoglobinuria.

The author gives photometric reproductions of the absorption spectra (fig. 4, p. 60), showing myoglobin bands shifted 3-5  $\mu\mu$  to the left (long wave, or red side) of oxyhaemoglobin bands, attributes the variation to the difference in constitution of blood and muscle pigments, and indicates that the renal threshold for the pigments is different. The red-brown colour of the urine in cases of so-called *Hæmoglobinuria paralytica* is due to myoglobin and metamyoglobin in both early and advanced cases of the disease, and no admixture with haemoglobin could be detected. The terms "myoglobinæmia" and "myoglobinuria" are therefore proposed to indicate that the pathological pigmentation is of muscular origin (p. 64).

The recorded observations on the rate of appearance and disappearance of katabolic pigments (bilirubin) in the plasma during the course of the disease, and the behaviour of the erythrocytes in regard to osmotic resistance against sodium chloride (practically normal), supports the general theory of the author. The small true haemolysis observed, and the small rise in plasma bilirubin about the third day, could be dealt with by the usual hepatic channels of elimination without producing marked urinary pigmentation.

In the comparative experiments on muscle glycogen (determined on small samples by micro-technique, Hagedorn-Jensen method following hydrolysis of glycogen extracted by modified Pflüger method) and lactic acid (modified Hirsch-Kauffmann method), data are given for "normal physiological equine limits" and for abnormal deviations throughout the course of the disease.

The author finds a rise in muscle glycogen during rest on high carbohydrate diet, very pronounced in those muscles most quiescent during rest and most generally affected at the onset of the disease. On bringing these muscles into active use there is an abnormally high rate of lactic acid production, which may sometimes exceed the physiological rate of removal by the circulation, so that a vicious circle terminating in partial coagulation of muscle protein and in degenerative changes in the cells may thus be set up (photographs of sections in appendix).

The sequence of affairs is summarised on p. 169 as follows:—

(1) Increase of lactic acid in the blood, small and transient in mild cases but pronounced in severe cases and often lasting until death supervenes or slaughter is decided upon;

(2) Increase of glycogen content in the muscles, showing up best after a few days in the undamaged or least affected muscles;

(3) Restriction of the capillary circulation as a result of swelling of the muscle fibrils, whenever the rate of conversion of glycogen into lactic acid (sudden exercise) exceeds the capacity of the local circulation to supply oxygen and remove waste products; followed by loss of motor function and degenerative changes.

In addition, it is shown by experimental procedure that:—

(1) The disease is readily reproducible by feeding a ration rich in sugar (3 kg. molasses per day) so long as the well-known predisposing factors are present (work and rest combination). It could not be produced by dietary measures alone and some horses are more susceptible than others (p. 169);

(2) By experimental restriction of the circulation in the hind limbs (foreign body emboli produced by intra-arterial injection of lycopodium powder and starch granules, p. 150), followed by enforced straining of the desired muscles, a clinical picture resembling that of the disease could be produced. The chief difference was that the localised muscular disturbance was not accompanied by myoglobinuria, although the blood picture resembled that of the disease in many particulars (p. 170);

(3) In normal horses, the production of lactic acid rises with work and is reflected in the blood in varying measures under different conditions. The rise in the blood is highest about 15 minutes after initial exercise, but after 45 minutes moderate work the figure is almost back to normal as a result of compensatory processes. For horses in good condition the variations during daily work are, therefore, not great. After a few days rest in the stall, however, sudden muscular effort is followed by unusual increase of lactic acid (and diminution of stored glycogen). The rise is most marked if the food is rich in carbohydrate (sugar in the experimental cases). As a general observation

the author finds the production of lactic acid during work somewhat smaller in summer and autumn than in spring, and also finds the normal glycogen content of horse muscle somewhat lower in summer and autumn than in winter or spring.

The concluding chapter of the monograph (pp. 171-177) gives an excellent general summary and a critical review of those portions of the bibliography which bear upon the author's main thesis, reconciling with considerable success the conflicting opinions of other authorities and harmonising all the most important observations with his own newer experimental data. Of particular interest is the final statement that relapses cannot occur after recovery, so long as the horses remain in work, and that a fresh attack can only arise *de novo*, *i.e.* when the usual predisposing conditions recur and resting muscles are again afforded an opportunity of storing up excessive quantities of glycogen.

KOLLATH, W. (1931). Mikrobiologische Versuche als Grundlagen der Vitaminforschung. [Microbiological Experiments as Basis for Vitamin Research].—*Zlb. Bakt. (Ref.)* **101**. 332-334.

A paper delivered before the "Wiener Gessellschaft für Mikrobiologie," ending with a brief discussion by the meeting. The author commences by considering the question of the vitamin requirements of bacteria, holding that it can best be settled by actual identification of the substances necessary for bacterial growth, combined with comparative trials in the recognised avitaminoses of animals. In his own experiments the influenza bacillus (denoted I.B.) was used because its accessory factors (X and V; see foot-note 1) apparently occur together in all aërobic living cells and are probably of general importance in "Redox Systems." (Reduction-Oxidation processes; see foot-note 2). The general Redox Potential of various systems is discussed. (O.R. potential, see foot-note 3).

The X factor is determined as an iron system analogous to that operative in the haematin-haemochromogen system; the V factor as a sulfhydryl system, since cystein-cystin (or better, glutathion) is active.

The systems found operative with I.B. were then investigated in animal experiments in order to ascertain whether any influence was exerted upon the course of vitamin deficiency diseases. Rats on a scorbutic diet of pea-nut oil developed "beriberi" to the extent of 75 per cent. on addition of haematin; the intestinal disturbances being delayed and life prolonged so that the lack of vitamin B showed up. On a cotton-seed oil diet, no such rearrangement of symptoms occurred, from which the author concludes that the composition of the fat is of importance in the scurvy syndrome. With the idea that haematin might operate in the catalytic oxidation of unsaturated fatty acids, linolenic acid was added to the cotton-seed oil. Marked toxic symptoms, with haemorrhages, occurred and haematin did not detoxicate.

In discussing anaërobiosis of the intestine, the author considers that enzymic digestive processes and cellular utilisation processes of food should be considered apart, as anaërobic and aërobic respectively. On the evidence of vital staining with alkaline methylene blue it is maintained that, in pigeon beriberi, the relationship between oxidation and reduction sites in the body cells is altered. Reducing areas are depressed, the opposite of the behaviour observed in extreme starvation.

The opening question in relation to bacterial vitamin requirements is regarded as unanswerable on the grounds that the experimental work on animals demonstrated a mixed etiology for the avitaminoses. Nevertheless, substances active in I.B. experiments are regarded as playing a part in animal metabolism and it is suggested that research into Eh under pathological conditions is the best way of evaluating the real significance of normal biological "redox potentials."

#### *Note 1.*

The X and V factors are two accessory growth factors regarded by THJOTTA and AVERY as necessary for bacterial life, just as vitamins A, B, C, D & E, are necessary for various forms of animal life, and as auximones are regarded as necessary for plant life. The V factor passes a porcelain filter and is thermolabile. The X factor is heat resistant. According to Kollath both are required by the influenza bacillus. Both are present in red blood cells and in many plant tissues. For further information and literature, see "Physiology and Biochemistry of Bacteria," BUCHANAN & FULMER (1930). **2.** 549.

#### *Note 2.*

The theories of oxidation-reduction processes in biology are too numerous to be summarised in connection with an abstract, but readers interested in the question may be referred to recent text-books such as BUCHANAN & FULMER'S "Physiology and Biochemistry of Bacteria." (1930). **8.** 105. et seq.

*Note 3.*

Since the term "Oxidation-Reduction Potential" (O.R.), expressed either as Eh in volts or as the logarithmic reciprocal rH, is rapidly coming into the literature within the reach of veterinarians, a brief explanation for the less advanced reader may not be out of place.

In modern physico-chemical theory, electricity is commonly treated as if it were a typical element and the symbol E is used to denote one equivalent (F coulombs in electrical units) of negative electricity. A "normal solution" of an oxidising agent is then treated as one which will take up one mol electron (E) per litre from a reducing agent; and a normal solution of a reducing agent as one which will give up one mol electron per litre to an oxidising agent. Oxidation is so defined in terms of electrons taken away from an atom (or group of atoms) and reduction in terms of electrons added to an atom. The tendency of a system to reduce another system is measured by its own tendency to be oxidised *i.e.* by its tendency to give up electrons. The "electron concentration" (Eh) is thus a measure of the intensity (not the quantity) of reducing power, or of oxidising power, just as the "hydrogen ion concentration" (Ch) is a measure of the intensity of acidity or of alkalinity (not the quantity of acid). The higher the concentration of free electrons in a solution the higher is its reducing power; and the lower the concentration the higher the oxidising power. Just as the Ch of a solution is conveniently expressed as the logarithmic reciprocal pH, so the Eh of a solution may also be expressed as the logarithmic reciprocal rH.

For convenient expression of O.R. potentials, a scale is taken between the normal hydrogen electrode (Eh = 0) and the normal oxygen electrode (Eh = 1.23). The term E<sub>o</sub> is used to designate the Eh value of an intermediate solution such that the E<sub>o</sub> of an oxygen electrode becomes + 0.810 and of a hydrogen electrode - 0.420.

As in the case of pH determinations where the electrometric method is the standard but the colorimetric method the one most convenient for general bacteriological work, so also is the determination of rH (or Eh) fundamentally electrometric but often more conveniently colorimetric.

Although many indicators are in use the one most commonly known is methylene blue, a compound which is deep blue when fully oxidised and colourless when fully reduced. It has an E<sup>o</sup> value (*i.e.* the Eh value of a solution in which oxidised and reduced indicator are present in equal amounts) of + 0.025 volts, with a corresponding rH value of 14.8; and has an Eh range from + 0.16 to -0.04 as it changes from blue to colourless.

These terms Eh and rH are rapidly coming into use in general bacteriology and will soon be as familiar to routine workers as the term pH now is. In any culture of microorganisms it is always of value to know (*a*) the Eh value of the original medium, (*b*) the Eh value of the medium after the organisms have grown; and (*c*) the total reducing power of the solution as determined by titration with a standard solution of an oxidising agent *i.e.* the amount of oxidising agent which is required to bring the culture back to the Eh value of the original medium.

The parallel with determinations of pH, and of total acidity or alkalinity, will be obvious. The term "poising action" is used for rH in a somewhat analogous sense to "buffer action" for pH. The tendency of a medium to cause oxidation or reduction is of the greatest importance for bacterial growth, and it is now an almost commonplace procedure to add substances (*e.g.* cystin) to media to influence this property. The abstract of the paper on "Gas Tensions in Tissues" [CAMPBELL, A. (1931). See this *Bulletin* 1. 157-160.] may be consulted for use of the terms Eh and rH, in another biological connection. [The use of cystin in the cultivation of anaërobic bacteria is exemplified in the paper by FREI and HALL (see this *Bulletin*. 1. 255)].

ORR, J. B. (1931). **Iodine Supply and the Incidence of Endemic Goitre.**—*Med. Res. Coun. Spec. Rpt.* No. 154. London: H.M. Stationery Office, 4d.

ANNOTATION. (1931). **Iodine and Goitre.**—*Lancet.* 220. 588.

This report, issued by the Committee on Human Nutrition of the Medical Research Council, follows on an earlier review in the same series [ORR, J. B., & LEITCH, I. (1929). **Iodine in Nutrition.**—*Med. Res. Coun. Spec. Rpt.* No. 123. H.M. Stationery Office, 2s. 6d.]

The introduction deals with overseas investigations (America, Switzerland, New Zealand) correlating the prevalence of goitre with the level of the iodine intake in food and drinking water.

The information relating to Britain is reviewed and the publication itself greatly extends the available data for England and Scotland from a public health point of view.

A preliminary difficulty was encountered in obtaining accurate statistics concerning the real incidence of endemic goitre in various districts and it is emphasised that any further work in the same direction should be preceded by a more precise goitre survey. After pointing out that iodine in drinking water normally forms only a small proportion (5 to 15 per cent.) of the total iodine ingested, the author records comparative analyses of foodstuffs.

When taking feeding samples from various areas, soils were also included for future reference. Included among 458 substances analysed are 373 foodstuffs covering milk, eggs, potatoes, cabbages, lettuce and other vegetables; also pastures and blood and thyroid glands from sheep slaughtered in appropriate districts. The data shown in tabular form are expressed as γ per 100 c.c. or 100 g.

( $\gamma = 0.001$  mg. iodine), the method used (Leitch-Henderson modification of Winkler's principle) being discussed in Appendix 2 and regarded as sufficiently reliable in the hands of an experienced worker.

The results of the investigation are not treated as conclusive and the author, although offering the opinion that the iodine supply may be lower in parts of the country where goitre is endemic (e.g. Derby) than in parts which are completely free (e.g. N.E. Scotland), is careful to point out that the data provided no conclusive evidence of specific correlation between "iodine deficiency" and "occurrence of goitre."

With regard to sheep, the lowest level of thyroid iodine was correlated with low iodine levels in pasture, but no definitely goitrous glands were found.

In spite of the good results obtained in preventing goitre in children by the administration of potassium iodide, the author ends on a cautious note:—"The question of whether deficiency of iodine is a cause of goitre and if so, whether it is the sole cause, must remain open."

BALL, V., & RIGOLLOT, R. (1931). Les goitres toxiques. La maladie de Basedow ou goitre exophthalmique et l'adénome toxique des Américains. (goitre basedowifié des Français). [The toxic Goitres. Basedow's Disease, or exophthalmic Goitre, and toxic Adenoma of the Americans].—*Rev. vét. et J. Méd. vét.* 83. 185-205. 5 plates, 5 figs. [8 refs.]

The authors review the past records of exophthalmic goitre or Basedow's disease and of toxic adenoma; they point out that, although the former condition has been recorded in animals, the only case of the latter has recently been noted by Ball in an aged dog. They give an account of the symptoms, etiology, pathological anatomy and histology and methods of treating each condition in man as described by various authors. They also give details of an original observation they have made on a two year old dog affected with both Basedow's disease and an accessory toxic adenoma at the base of the tongue. Since both conditions are characterised by analogous histological changes, the authors conclude that they are merely clinical varieties of the same disease. This conforms with the opinions expressed by BÉRARD, QUERVAIN and HOLST regarding the disease in man.

MATSON, J. (1931). Beneficial Effects of Potassium Iodide in Cases of delayed shedding of Calf Hair.—*Agric. & Livestock in India*. 1. 287-298.

In India, the hybrid calves of European and indigenous stock sometimes develop long hair which persists instead of being shed normally and such animals are always unthrifty. This condition is apparently due to faulty nutrition; an improvement occurred when potassium iodide was given at the rate of 3 ozs. to 100 lb. of a mineral mixture used in the ration. No further cases of this type of unthriftness occurred after this addition to the diet had been in use for a year.

SJOLLEMA, B. (1931). De Symptomen van Grastetanie van het Rund. [The Symptoms of Grass Staggers in Bovines].—*Tijdschr. Diergeneesk.* 58. 80-85.

The author describes the symptoms of grass staggers and indicates the manner in which they differ from those of milk fever.

## IMMUNITY.

GREENWOOD, M., TOPLEY, W. W. C., & WILSON, J. (1931). Contributions to the Experimental Study of Epidemiology. The Effect of Vaccination on Herd Mortality.—*J. Hyg. Camb.* 31. 257-289. 28 tables. [21 refs.]

Working with *Bact. aertrycke* infection in mice, the authors have investigated the effect of non-specific and of specific vaccines and the degree of protection afforded in herd infection.

The only vaccines found to be of significant value were those containing the O somatic antigen of *Bact. aertrycke*.

It was found that the mice inoculated with this vaccine survived longer than non-vaccinated mice, the advantage being most marked between the 25th and 30th days of exposure; after a longer exposure no appreciable degree of resistance could be observed.

The authors do not consider that even the most efficient form of vaccination can be expected to afford complete protection against severe and prolonged exposure, but with less exacting conditions the advantage resulting from such vaccination may be equivalent to an effective degree of immunity.

STOESSER, A. V. (1931). **The Toxin-antitoxin Union.**—*J. Infect. Dis.* **48.** 255-281. 10 tables. [48 refs.]

The author gives a detailed account of the discoveries which have led to the present-day conception of the mechanism involved in toxin-antitoxin union and of the influence of research on surface tension depressants upon our knowledge of the phenomenon.

He records experiments which are considered to yield evidence in confirmation of the theory that the toxin-antitoxin union is a colloidal adsorption phenomenon.

It is suggested that, in the same way as the addition of sodium ricinoleate to a colloidal system causes a depressant effect, the addition of an analogous substance to a toxin which is considered to represent such a system causes loss of pathogenicity while antigenic potency is retained.

He records work carried out in the course of an attempt to verify these conclusions, substituting antitoxin for soap; he employed an easily detectable toxin, *i.e.*, the haemolytic toxin of the mushroom *Amanita phalloides*, and used a 2 per cent. suspension of red blood corpuscles to indicate the presence or absence of free toxin.

A quantity of antitoxin which would neutralise a certain quantity of toxin in a given concentration was determined and it was found that, by keeping the ratio of toxin to antitoxin constant and by increasing the concentration of the mixture, neutralisation of the toxin became less and less complete until eventually it could not be detected.

In addition the union of toxin and antitoxin exhibited the Danysz colloidal phenomenon.

PREDTECHENSKY, S. N. (1931). **Production of Potent Antitetanic Serum.**—*J. Immunol.* **20.** 143-148. 4 tables. [8 refs.]

In his preliminary paragraphs, the author refers to the variable potency of antitetanic sera obtained from different sources and claims that he has been able to produce sera (from three horses) containing 1,500 to 2,000 units, (presumably American units) per c.c.

His original cultures were obtained from a number of Russian bacteriological institutes, but he states that, on examination, some of them did not appear to be cultures of the tetanus bacillus.

The strain selected produced a toxin which was fatal in 0.00006 c.c. (test animal not stated).

"Test toxin" and "standard serum" for comparisons were received from the State Institute at Moscow and the author's sera were sent to that Institute for official control. Tabular statements show the quantities of toxin and serum or of toxin alone administered and the dates upon which the injections were given. The process of immunisation appeared to require some seven weeks with injections about every three days. In each case what is called a "ground immunity" was set up by a few preliminary injections of serum and toxin followed by toxin alone. An interval of three or four months was allowed to elapse between this immunisation and the intensive hyperimmunisation. It would appear that this production of "ground immunity" followed by a rest of some months was in reality accidental as the supply of toxin failed for a time.

The antitoxin content of the serum was observed to fall to about half its maximum or even lower when immunisation was persisted in over a period of 18 months.

Further tests are promised.

RAMON, G., & LEMÉTAYER, E. (1931). Essais sur l'immunité antitoxique active et sur la production de l'antitoxine tétanique chez le cheval. [Researches upon Antitoxin Immunity and the Production of Tetanus Antitoxin in the Horse].—*Bull. Acad. vét. de France*. 4. 84-95. 4 tables. [13 refs.]

Two factors influencing the production of antitetanic serum are dealt with; *i.e.* (1) the use of preparatory immunising doses of anatoxin given one year before hyperimmunisation is commenced and (2) the addition of non-specific substances to the anatoxin used as antigen.

The sera of 100 horses which had been inoculated twice with 10 c.c. of anatoxin and tapioca a year previously were found to contain an average of 0.001 of an international unit of tetanus antitoxin per c.c. Another inoculation was then given and 15 days later the titres of the sera ranged from two to 20 units per c.c. The antitoxin content of the sera of control animals which had not been vaccinated a year previously was barely appreciable.

Two further inoculations of 50 c.c. and 100 c.c. respectively raised the average titre to 300 units as against less than 20 units in the control animals.

The authors consider that the preliminary vaccination produces a small amount of antitoxin; this operates in a similar manner to the diphtheria antitoxin which is found naturally in many horses and which is of such value in the production of hyperimmune anti-diphtheria serum.

They inoculated four groups of five horses each with two injections of:—(1) tetanus anatoxin; (2) anatoxin + 1 per cent. tapioca; (3) anatoxin + 1 per cent. potassium alum and (4) anatoxin + 1 per cent. calcium chloride. Eight days later the potency of the sera of the horses was estimated and found to be 0.005, 0.88, 0.24 and 0.33 units per c.c. in each group respectively.

The addition of tapioca to the antigen increased the titre at least 150 times.

Applying these principles, the authors produced sera with an average titre of 4,800 units per c.c. in 25 horses in a period of seven weeks.

RAMON, G., DESCOMBEY, P., & LEMÉTAYER, E. (1931). Sur l'immunisation antitoxique active et sur la production intensive de l'antitoxine tétanique chez le cheval. [Active Antitoxic Immunisation and the Intensive Production of Tetanus Antitoxin in the Horse].—*Ann. Inst. Pasteur*. 46. 444-456. [14 refs.]

The authors give an account of the results of their research on the improvement of the tetanus antitoxin-producing power of the horse.

They found that, although horses vaccinated by the routine method showed only an average serum content of 0.001 of a unit (international) per c.c. of antitoxin when examined one year later, the effect of a further inoculation of tapioca along with anatoxin, after the year's interval, was to multiply the serum content from 2,000 to 20,000 times. The further inoculation of two successive larger doses brought the average serum content up to 300 units (international). Control horses, not previously vaccinated, showed only a trace of antitoxin after one injection and less than 20 units after the third injection.

The addition of non-specific substances to the inoculum, by favouring local inflammatory reaction and inhibiting elimination of the antigen, augments the antitoxin production.

The authors carried out a controlled experiment on horses to ascertain the value of powdered tapioca, potash alum and calcium chloride respectively as adjuncts to the antigen inoculations. The injection of all these non-specific substances with anatoxin was found to result in hyperleucocytosis and this was most marked with tapioca; the injections containing tapioca gave most antitoxin, 150 times as many units as the injection of anatoxin alone.

A routine method applied by the authors is the inoculation of horses simultaneously with diphtheria and tetanus anatoxins; if they do not prove adaptable for diphtheria work they are used for tetanus.

In conclusion, by utilising previously vaccinated horses, injecting anatoxin instead of immune serum and adding powdered tapioca to the inoculum in the process of hyperimmunisation, the authors obtained results superior to any previously described.

Twenty-five producer horses averaged 4,800 units (international) of antitoxin, some individuals reaching 10,000 units. These figures are many times greater than any previously recorded.

GLENNY, A. T., BUTTLE, G. A. H., & STEVENS, Muriel F. (1931). Rate of Disappearance of Diphtheria Toxoid injected into Rabbits and Guinea pigs: Toxoid precipitated with Alum.—*J. Path. Bact.* 34. 267-275. 6 tables. [14 refs.]

This paper forms one of a large number dealing with the response to toxoid injection. It has been generally shown that intravenous injection of toxoid or anatoxin does not stimulate the animal body to antibody production, probably because of rapid elimination. Delayed absorption and elimination appear to be essential for the satisfactory production of antibody.

The addition of a variety of substances; e.g. tapioca, alum etc.—to toxoids injected subcutaneously, achieves this object.

Where primary and secondary stimulation is achieved by two injections, the interval between the injections should be as long as possible, as in these circumstances the response to the second injection is greatly increased. "The effects of any injection into a normal animal may be regarded as a continual stimulation produced by lessening quantities of antigen acting upon tissues whose power of response is rapidly increasing. The importance of the retention of antigen in the system is thus evident."

The authors describe experiments to show (1) that toxoid alone injected into an animal is so rapidly eliminated that very little is available to act as a continuous stimulus and (2) that the improved response, due to the addition of alum to toxoid, can be attributed to the fact that the antigen is in the form of a relatively insoluble precipitate which remains in the body sufficiently long to continue its action after the tissues have acquired the power of rapid response.

They find that diphtheria toxoid is rapidly eliminated after injection, that the addition of alum increases the antigenic efficiency of the toxoid by retarding absorption and elimination and that precipitants such as cerium nitrate, zinc sulphate, calcium chloride, dialysed iron and tungstic acid, act in a similar manner.

SUGG, J. Y., RICHARDSON, L. V., & NEILL, J. M. (1931). Transmission to the Third Generation of Antitoxin derived by Active Immunisation of the First Generation.—*J. Immunol.* 20. 255.

A case is recorded in which a guinea pig which had acquired passive immunity by placental transmission of antitoxin from the dam again transmitted antitoxin to its young. Guinea pig 1 was actively immunised with diphtheria toxoid. 136 days later when it gave birth to guinea pig 2 its serum contained eight units of antitoxin. 148 days after birth when the blood of guinea pig 2 contained 0.002 units, it gave birth to guinea pig 3. The latter was bled 30 minutes after birth and before it had received colostrum. Its serum was found to contain 0.002 units of antitoxin.

GLENNY, A. T., LLEWELLYN-JONES, M., & MASON, J. H. (1931). The Intracutaneous Method of Testing the Toxins and Antitoxins of the "Gas Gangrene" Organisms.—*J. Path. Bact.* 34. 201-211. 14 tables. [6 refs.]

Dried *B. welchii* toxin, obtained by the precipitation of bacterial free filtrates with saturated ammonium sulphate, is used for test purposes.

The intracutaneous injection of toxin into guinea pigs produces areas of necrosis which are evident at the 4th hour and by the 18th hour a satisfactory reading of the reaction can be obtained.

The intracutaneous method of titrating the values of *B. welchii* antitoxin has given approximately the same values as those obtained by intravenous and intramuscular injections into mice.

The interpretation of the readings of the reaction produced by toxin-antitoxin mixtures is dependent upon the degree of the reaction shown by each guinea pig to a control inoculation of *B. welchii* toxin.

The antitoxin value of normal horse serum is ascertained by testing the sera against fractional test doses of toxin. The strength of the antitoxin produced after immunisation of the horse bears some relationship to the pre-immunisation or normal antitoxin values.

The toxins and antitoxins of *Vibrio septique*, *B. edematiens*, *B. histolyticus* and the "lamb dysentery bacillus" may be titrated with reasonable accuracy by the intracutaneous method.

NEUMANN-KLEINPAUL, K., & RUESCHER, W. (1931). Die Serum- und Antivirusbehandlung der Druse und des Morbus maculosus. [The Serum and "Antivirus" Treatment of Strangles and of *Purpura haemorrhagica*].—*Arch. wiss. prakt. Tierhik.* 63. 91-103. 4 temperature curves. [4 refs.]

A clinical paper containing an account of the treatment, at an army remount depot in Germany, of cases of strangles and *purpura haemorrhagica*. The authors used highly potent, hyperimmune, polyvalent, anti-streptococcus serum both alone and in combination with live culture and they also used polyvalent streptococcus antivirus (Besredka's culture filtrate). All three methods of treatment are said to have given satisfactory results. "Serum alone" was less effective than serum-simultaneous inoculation; local treatment of abscesses with "anti-virus" gave good results. The authors give some details concerning the preparation of these biological products.

VAYSSE. (1931). De la Sérothérapie paraspécifique dans le traitement de certaines maladies infectieuses des animaux. [Paraspecific Serotherapy in the Treatment of certain Infectious Diseases of Animals].—*Bull. Acad. vét. de France.* 4. 43-49.

The author describes a number of cases in which he has successfully treated fowl pox, swine plague, swine erysipelas, swine pox and anthrax by non-specific serum inoculations. Normal horse serum was chiefly used and he considers, in accordance with the opinion of DARIER, that its action is due to a general stimulation of the haematopoietic system.

KENNEDY, James A. (1931). Isohemagglutination: the Work of Jan Jansky with a critical Analysis.—*J. Immunol.* 20. 117-141. 2 figs. 4 tables. [16 refs.]

In order that the data may become generally available the author republishes the essentials of JANSKY's original paper which first appeared in an obscure Bohemian journal in 1907 and analyses it critically. A further reason for republication is the irrelevant title of the original paper.

The author reproduces, in the original form, JANSKY's table shewing the results of blood-grouping tests and then gives it in a rearranged form; this shows clearly that the blood samples fall into four groups.

BIER, O. G. (1931). Sur les relations entre le sérozyme et les constituants de l'alexine. [On the Relationship between Serozyme and the Constituents of Alexin].—*C.R. Soc. Biol. Paris.* 106. 374-376. [8 refs.]

The work of FUCHS, FALKENHAUSEN and others, [Zeitschr. Immun. Forsch. (1929) 62. 107-116.] on the part played by alexin in the coagulation of the blood, is quoted by the authors. These earlier workers identified the "serozyme" of BORDET and DELANGE (prothrombine of SCHMIDT) with the globulin fraction of alexin. COSTA CRUZ on the other hand, [Mem. Inst. Osw. Cruz., Rio de Janeiro (1930) 23. 126-128.] arrived at the conclusion that the thermolabile constituent of alexin had no immediate connection with serozyme.

In view of this conflict, the authors took up the question. They undertook fractioning of alexin by various methods, using plasma free of serozyme, the latter being adsorbed with tricalcium phosphate (Bordet method) and with magnesium hydroxide (Fuch's method). They used plasma of the ox and of the mouse (oxalated, 0.2 per cent.) and albumin and globulin fractions of the guinea pig (isolated by the Liefmann-Braun technique). The serozyme content of the various isolated alexin fractions is tabulated; coagulation was observed at 37° C.

In studying mouse plasma, they found no haemolysis with 0.5 c.c. in the presence of 0.5 c.c. of corpuscles at 2.5 per 100 and 0.5 c.c. of haemolytic serum (representing 20 units). On adding 0.25 c.c. of guinea pig albumin fraction, at 1 per 10, haemolysis was complete even with 0.005 c.c. The serozyme was easily detected with 0.5 c.c. mouse plasma in the presence of 0.25 c.c. phosphated rabbit plasma and 1.25 c.c. calcium chloride solution (about 0.3 per cent.).

On account of its low albumin fraction, ox plasma was taken for comparing the observations of COSTA CRUZ on yellow fever patients. Plasma of the latter was recorded as giving no haemolysis

with 0.2 c.c., but total haemolysis with about 0.04 c.c. after addition of the albumin fraction. Ox plasma gave no haemolysis with 0.5 c.c., but total haemolysis at 0.01 c.c. after addition of albumin. Ox plasma showed a high content of serozyme since it effected the rapid and complete coagulation of phosphated plasma at a dosage of 0.05 c.c.

The Congo Red technique of GORDON [*J. Immunol.* (1930) **19**. 303-305] is used by the authors to show that, although this compound inactivates alexin, it has no action on serozyme. Animal charcoal, which restores the alexin function to plasma inactivated by Congo Red, retarded the rate of coagulation, probably by adsorption of serozyme.

The authors conclude that there is no immediate relationship between serozyme and the thermolabile constituent of alexin.

BOEZ, L., & MARNEFFE, H. (1931). Influence de la concentration saline (chlorure de sodium) sur le pouvoir bactéricide du sang. [**Influence of the Concentration of Sodium Chloride upon the Bactericidal Power of the Blood.**].—*C.R. Soc. Biol. Paris.* **106**. 358-360. 1 graph. [2 refs.]

This paper is a continuation of observations by Boez [*C.R. Soc. Biol. Paris.* **101**. 848 & 1009] on the relationship between the bactericidal power of blood and the reaction of the medium.

The organisms discussed are Shiga's bacillus, *B. typhosus* and *B. proteus*, and a graph is given in which bacterial numbers are plotted against concentration of sodium chloride in the case of *B. proteus* with rabbit blood at pH 7.7. The general technique consisted in distributing rabbit blood over a series of tubes, bringing to varying concentrations of NaCl, adjusting to standard pH (about neutrality), adding a definite quantity of bacterial suspension, and incubating at 37° C. The degree of bacteriolysis was measured by subsequent enumeration of bacteria.

The general conclusions are that the bactericidal power of blood is maximal for concentrations of sodium chloride between 8 and 16 per thousand. Below and above this critical zone, the bactericidal power diminishes. Distilled water was decidedly unfavourable. At 25 to 30 per mille sodium chloride, inhibition of bacteriolysis was very marked. When the salt concentration was raised still higher, however, bacteriolysis re-appeared as a result of the lytic action of the electrolyte itself. The authors consider that variation of bactericidal power is a function of the concentration of salts; they compare results obtained when sodium sulphate, phosphate, and nitrate, were used in place of chloride.

BOEZ, L., & MARNEFFE, H. (1931). Sur la destruction du pouvoir bactéricide du sang par le chlorure de sodium; application à l'hémoculture. [**Upon the Destruction of the Bactericidal Power of Blood by Sodium Chloride: Application to Hæmoculture.**].—*C.R. Soc. Biol. Paris.* **106**. 360-361. 1 table. [8 refs.]

The authors continue the work recorded in the paper abstracted above, applying the information gained upon the inhibition of bacteriolysis by high concentrations of sodium chloride, to the method of hæmoculture in solid media, a mixture of blood and saline being sown into agar containing 1.40 g. sodium chloride per litre.

They confirm their previous observation that sodium chloride is a valuable agent in destroying the bactericidal effect of blood and, in one case, succeeded in isolating *B. typhosus* from a case of septicæmia when simple hæmoculture in broth had failed.

A few data on hæmocultures, comparing sodium chloride with citric acid, are given in tabular form, using pneumococcus, *B. typhosus* and *B. coli*. The date of appearance of the colonies was much the same in the two procedures, but the number of the colonies in hæmoculture with sodium chloride was consistently higher, and the sodium chloride procedure is regarded as superior for anaërobic hæmoculture on solid media.

MACKIE, T. J., & FINKELSTEIN, M. H. (1931). **Natural Bactericidal Antibodies: Observations on the Bactericidal Mechanism of Normal Serum.**—*J. Hyg. Camb.* **31**. 35-55. 29 tables. [23 refs.]

The mechanism of the natural bactericidal reactions studied by the authors was shown to be

definitely comparable to that of an immune serum, involving the combined action of serum-complement and a heat-stable immune body. The serum-complement in various test animals was found to be interchangeable; the heat-stable agent showed a marked specificity for particular bacteria. A non-specific extracellular substance which neutralised the normal bactericidal action was shown to occur in the bacterial cultures; heating to high temperatures increased its amount and it could be removed from agar growths by repeated saline-washings.

## PHYSIOLOGY.

M'FADYAN, J. (1930). **The Corpora Amylacea of the Mammary Gland of the Cow.**—*J. Comp. Path. & Therap.* **43.** 291-300. 9 text figs.

In spite of opportunities for the study of *corpora amylacea* in the cow's udder, no definite conclusion appears to have been reached regarding their composition, structure and causation.

The present writer makes no claim to have settled these points, but he gives a more detailed account of their structure than has hitherto appeared. He supports his description with photomicrographs.

A summary of existing literature is given and from this it may be gathered that the bodies are of very frequent occurrence in the udder, but that they are not, as has been stated, constantly present.

One of the outstanding features of *corpora amylacea* is that the immense majority of them present a stratified appearance and, to judge from the staining reactions, that the strata vary in composition. It appears to be certain that they are not formed of amyloid material. The exact nature of the nucleus around which the bodies develop has not been determined, but the author is unable to agree with some of the views expressed in this connection by other writers on the subject.

There cannot be any doubt that increase in size results from accretion, around some central body or substance, of materials from the liquid present in the alveolus. That the laminæ are not calcareous in nature is shown by the perfect sections of the bodies which can be obtained without any decalcification.

WESTER, J. (1931). **Het Braken bij Herkauwers.** [Vomiting in Bovines].—*Tijdschr. Diergeneesk.* **58.** 3-13. 2 figs. [7 refs.]

By the administration, *per os*, of 10 g. of *pulv. veratri albi* in a 10 per cent. solution of bicarbonate of soda, the author has been able to produce vomiting in young bovine animals, in which rumen fistulæ had previously been established. Vomition occurs in from 1-1½ hours. The bicarbonate of soda is said to cause closure of the œsophageal groove with the result that the drug therefore passes directly into the abomasum. Inserting one hand into the rumen through the fistula, the author was able to palpate the cardia and to resolve the factors taking part in the process of vomiting.

He found that contraction of the abdominal muscles does not play a part in the evacuation of the stomachs and also that the stomachs themselves do not contract during the act. There is inspiratory fixation of the diaphragm, closure of the glottis and shortening of the œsophagus by contraction, and the combination of these factors produces a suction effect upon the stomach contents. The action agrees closely, in fact, with the process of rumination.

BUERKER, K. (1931). **Ergebnisse vergleichender hämatologischer Untersuchungen.** [The Results of comparative haematological Investigations].—*Arch. wiss. prakt. Tierhik.* **63.** 12-22.

An account of a comparative haematological study of the blood of human beings and of various domesticated and laboratory animals including a pig, dog, horse, ox, sheep, goat, rabbit, fowl and pigeon.

HAYDEN, C. E., & SAMPSON, Jesse. (1931). **A Study of some Organic and Inorganic Constituents of the Wing and Throat Blood of Laying and Non-Laying Rhode Island Red Hens.**—*Annual Report, New York State Veterinary College for the year 1929-30.* 174-182. [11 refs.]

Twelve yearling laying hens were selected for this investigation, but as two of them proved non-laying they were used as controls. Mixed arterial and venous throat blood and venous wing blood samples were taken from each bird. The following 14 blood constituents were analysed and the results are given in tabular form:—serum protein; calcium; inorganic phosphorus; acid soluble phosphorus; haemoglobin; sugar (Folin and Haskin methods); total non-protein nitrogen; urea nitrogen; amino acid; uric acid; preformed creatinine; lactic acid; free phenols and chlorides. The serum protein percentage was calculated from the refractive index. Variations between the blood of laying and non-laying hens chiefly concerned the serum protein, calcium and uric acid, all of which were present in higher concentration in laying hens and were presumed to be in accordance with the demands of the egg-forming organs. On the other hand the figure for total non-protein nitrogen was 20-30 per cent. higher in the non-laying group of birds.

DUKES, H. H., & SCHWARTE, L. H. (1931). **The Blood Pressure of the Pig and the Influence of Non-nervous and Nervous Factors on the Cardio-vascular Apparatus.**—*J. Amer. Vet. Med. Ass.* 79. 37-62. 21 figs. [17 refs.]

The authors emphasise the need for physiological research on all species of farm animals. As little work has been done on the pig, they have undertaken to study the question. This first paper deals with observations on blood pressure recorded by a manometer connected with the carotid artery. Twenty-six pigs of both sexes and of various breeds and sizes were used and it was found that the average blood pressure varied very little. In 14 pigs the mean carotid pressure was 169 mm. of mercury. This is higher than the normal blood pressure of ruminants.

The maximum pressure taken in the carotid artery at systole was 200 mm. and the minimum pressure during diastole was 140 mm., so that the pulse pressure was 60 mm. Using a pig confined in the dorsal position, the authors found that, when the anterior extremity was raised, the blood pressure fell and that it rose when the anterior extremity was lowered. Compression of the abdomen caused a rise in pressure. Ligation of both carotid arteries caused hardly any change in blood pressure, but asphyxia increased it to over double the normal amount.

Conflicting results were obtained in experiments to test the effect of respiration on blood pressure.

Adrenalin, (P.D. & Co. 0.2-1.0 c.c.) injected intravenously or intracardially in a single dose, caused a great increase in blood pressure for  $2\frac{1}{2}$  minutes. Pituitrin had a similar effect.

The rate of the heart beat was accelerated by the injection of atropine and by cutting the vagi nerves; it was lowered by stimulation of the peripheral ends of these nerves and the right vagus was found to be more inhibitory than the left. Stimulation of the central end of the vagus sometimes caused a rise and sometimes a fall in blood pressure. Stimulation of the anterior laryngeal nerve had no effect on the blood pressure. Stimulation of the central end of the sciatic nerves caused a rise in the majority of cases.

Varying results, dependent upon the technique adopted, were obtained in experiments to determine the effect of stimulating various parts of the cardiac plexus, but stimulation of sympathetic nerves was always followed by a great rise in blood pressure.

The vasoconstrictor centre in the medulla has a distinct effect upon the maintenance of blood pressure as a fall occurred after the cervical spinal cord had been severed.

COLE, H. H. (1930). **A Study of the Mucosa of the Genital Tract of the Cow, with Special Reference to the Cyclic Changes.**—*Amer. J. Anat.* 46. 261-290. 5 plates. 22 figs. [12 refs.]

31 animals—cows or virgin heifers—were used in this work. They were killed at known phases of the oestrous cycle and tissues were taken for histological examination from different localities, from four levels of the vagina, from the *cervix uteri* and from the uterine cornua. In addition, tissue was taken from each ovary through the largest Graafian follicle or the most recently ruptured follicle.

In two animals killed during active *oestrus*, ovulation had not occurred, but it had occurred

in other animals killed one day past *œstrum*. At this time the young *corpus luteum* measured 6-8 mm. in diameter and, in an animal killed seven days after *œstrum*, it had increased to 20 mm. ; the mature *corpus luteum* may measure as much as 25 mm. in diameter.

There was congestion of the vestibule during *pro-œstrum* and *œstrum*. At and up to eight days after *œstrum* the wall of the vagina, anterior to the hymen and up to about 2 cm. behind the cervix, showed an intense infiltration of leucocytes and blood extravasation. In front of this point changes were more striking. At *pro-œstrum* large columnar mucus-secreting cells constituted the superficial epithelium with two or three layers of polyhedral cells underneath. These cells apparently disappeared partially at *œstrum* and they were again seen in the *post œstrous* period. At 8-11 days after *œstrum* this part of the epithelium appeared to be vacuolar and degenerated.

Two days after *œstrum*, mucus-secreting cells were found in the vagina immediately adjacent to the cervix and it was concluded that these cells increase in number and activity at the cervix and that this change extends along the vagina at *œstrum*.

Changes in the cervix proper were similar to those occurring in the vagina adjacent to it. During *œstrum* the endometrium of the uterine horns showed congestion and œdema.

PUPILLI, G. (1931). Sul comportamento di alcune sostanze coloranti di fronte al globuli rossi di diversi animali. [The Action of certain Stains upon the red Corpuscles of certain Animals]. —*Biochem. Terap. sper.* **18**. 116-117. 3 figs. 5 tables. [8 refs.]

This paper deals with the subject from the biochemical, rather than from the histological, point of view. The acid dye selected—tropeolin 000—behaves according to the law of dissociation, while the basic dyes—methylene green, methyl green and rosanilin—are adsorbed.

ROBERTS, W. Morrell. (1931). The Effect of Oils on Gastric Secretion and Motility.—*Quart. J. Med.* 138-152. 2 tables. 20 charts. [11 refs.]

ANNOTATION. (1931). Olive Oil and Digestion.—*Lancet.* **220**. 537-538. [1 ref.]

This paper is of wider interest to medical practitioners than to veterinarians, but the point of view expressed by the author has its veterinary applications in special cases. In considering the therapeutic uses of olive oil in certain digestive disorders, the author finds that fats, especially when given before food, reduce the physiological responses of the stomach, diminishing peristalsis and acidity. Placed directly into the duodenum (by tube) it causes closure of the pylorus and retards the discharge of gastric contents.

He also finds that oil has a definite inhibitory influence upon the psychic secretion and considers that, in cases of hypersecretion and hyperperistalsis, it is physiologically sound to administer oil before a meal. A tablespoonful of olive oil is stated to lessen post-prandial discomfort and heart-burn ; partly because of stimulus to bile secretion, partly through the action of fatty acids formed during digestion and partly on mechanical grounds. The effect is also laxative.

The use of olive oil, administered on a fasting stomach, is also recommended in hyperchlorhydria and in cholecystitis. Its employment plays an important part in the treatment devised by SIPPY and COLEMAN for disorders of the alimentary tract.

PAPILIAN, Victor, & RUSSE, Ioan-Gabriel. (1931). Effets de la ligature de la veine splénique sur le système réticulo-endothélial. [Effects of Ligature of the Splenic Vein on the Reticulo-Endothelial System].—*C.R. Soc. Biol. Paris.* **107**. 380.

The splenic vein of rabbits was ligatured; 20 hours later an injection of carmine lithinate was given and this was repeated daily. As a result of this treatment, the reticulo-endothelial elements of the liver and bone marrow hypertrophied and increased in number, whereas in control animals they remained constant. A reverse effect was seen in the mesenteric lymph glands ; the phenomenon of phagocytosis was markedly diminished in these glands.

EPHRUSSI, B. (1931). Vitesse de croissance et vitesse de régénération des cultures de tissus *in vitro*. [The Rate of Growth and Regeneration of Tissue Cultures *in vitro*].—*C.R. Soc. Biol. Paris.* **106.** 274-277. 1 fig. [4 refs.]

—. (1931). Action de l'extrait embryonnaire sur la vitesse de régénération des cultures de tissus. [The Action of Embryonic Extract on the Rate of Regeneration of Tissue Cultures].—*C.R. Soc. Biol. Paris.* **106.** 546-548. 2 figs.

Tissue cultures prepared after the method of FISCHER (1929) grow for a time; growth then ceases and they remain inactive. If a latent culture is injured, for instance, by the excision of a sector of it, vigorous renewed growth begins at the injured part and new tissue quickly fills in the gap; growth then ceases again.

FISCHER considered that the great spread of this repair process was more apparent than real and that the growth was not itself rapid, but merely the result of slow growth from a large surface of tissue. Ephrussi, on the other hand, considers that such regenerative growth really is rapid and much more so than the culture as a whole; he supports his opinion by measurements of the new growth compared to a unit length of the periphery of the whole culture.

In the second paper, the author relates how he found that, if a solution of embryonic extract is applied to the previously injured surface of a tissue culture, the resultant regenerative growth is much more vigorous than that of an injured culture which has not been so treated. In all cases this new repair growth stops as soon as the defect in the culture as a whole is made good.

#### PUBLIC HEALTH.

GATES, W. B. V. (1931). The Army's Milk Supply.—*J. R. Army Med. Corps.* **56.** 359-366. 4 tables. [5 refs.]

A short account of the use of milk in the early days of history is followed by a description of its chemical and physical properties.

In peace time the supply of fresh milk to troops in this country is comparatively easily dealt with, but this is not the case on active service.

The merits of both fresh and dried milk are compared with those of condensed milk. The author concludes that dried milk prepared by the improved roller method, as distinct from the spray process, is the best product available for use under active service conditions. Vitamins are not destroyed, it is bacterially purer and bulk for bulk it is more concentrated than liquid condensed milk. It is less subject to decomposition, is easy to transport and keeps twice as long as condensed milk or milk powder prepared by the spray process.

The methods of preparation of condensed and powdered milks are described.

STEIBING, C. C. (1931). Milk Control.—*North Amer. Vet.* **12.** 17-18. [3 refs.]

ASTOR. (1931). The Problem of the Milk-Supply.—*Lancet.* **220.** 771-773.

Steibing draws attention to the small number of veterinarians employed in the U.S.A. for the control of the milk supply. He considers that city authorities do not give sufficient recognition to the need for veterinary supervision. In 18 States there are only 181 whole-time veterinarians.

He discusses the duties of public health veterinary officers and the knowledge they should possess.

The House of Lords discussed certain aspects of the British milk industry.

BERGER, H. C. L. E. (1931). De Ontwickelingsgang van Overheidsmaatregelen in Nederland tegen Besmettlijke Veeziekten. [The Development of the Official Regulations for the Control of Contagious Diseases of Animals in Holland].—*Tijdschr. Diergeneesk.* **58.** 86-105.

An account of a speech made at Utrecht University on November 3rd, 1930. The author traces the growth of the system of official regulations in force in Holland for the control of contagious diseases of animals.

I. — (1931). Veterinary Meat Inspection.—*Vet. Rec.* **11**. 671-672.  
 II. GRANT, Ross. (1931). Meat Inspection in Relation to Public Health.—*Austral. Vet. J.* **7**. 18-25.

I. The appointment of a veterinarian by the Health Department of the City of London in 1909 which followed the recognition of the true position of the veterinary profession in relation to meat inspection in this country, has had far-reaching effects both at home and abroad.

The resultant demand for improvement in the quality of imported meat led to reorganisation of the systems of inspection in the countries which supply the home market. Great progress has, in consequence, been made in this important phase of public health work. The work of the veterinary officers now attached to the health departments of many large towns is elaborated.

II. After pointing out that the main purpose of a meat inspection system should be to supply the public with healthy food, the author shows how such a system has been brought into being by the demands of commerce rather than by the demands of public health authorities.

The adoption of certain methods of meat inspection in the United States has shown that, from a business point of view, strict supervision of the health of animals prior to slaughter, elimination of affected meat and the adoption of measures to prevent the use of harmful dyes, preservatives etc., is economic in that the resulting product packs and travels better and is in greater demand by the public.

The efficiency of the system of inspection increases with the dependance of a country upon its meat product exports ; examples are seen in Australia, the Argentine and Uruguay.

Although the importance from the public health point of view of an organised system of inspection is recognised in Europe, the system applied to the domestic supply in some countries is below the standard which is desirable.

After giving a summary of the diseases which are of most importance in relation to public health, the author directs attention to the opportunities provided by an efficient inspection system, carried out in co-operation with the field staff, to locate disease in the different parts of the country concerned.

BOLIN, F. M. (1931). The Detection of Horse Meat as an Adulterant in Sausage and other Studies of the Precipitin Test.—*J. Amer. Vet. Med. Ass.* **78**. 163-169. 6 tables. [4 refs.]

The author describes his technique and the results he has obtained with the precipitin test for the identification of specific proteins. He found that, in the preparation of immune serum against horse protein, horse meat extract antigen gave more reliable results than horse serum antigen.

Meats of closely related species could only be differentiated by the length of time elapsing before a reaction occurred. Cooked meat antigens produced specific antibodies against uncooked homologous protein and non-specific antibodies against those of various cooked meats. The sera of immature animals probably contained a natural precipitin against the protein of the dam.

KERSTENS, C. J. A. (1931). Over het gebruik van den Hellige comparator voor Vleeschextracten. [The Use of the Comparator for Meat Extracts].—*Tijdschr. Diergeneesk.* **58**. 694.

The author gives a table showing the pH values of extracts with different indicators. The initial letters only are given, but it would appear that the indicators were methyl red, brom cresol purple and Bromthymol-blue.

#### SPECIFIC THERAPY.

LAUNOY, L., NICOLLE, P., & PRIEUR, M. (1931). De l'action trypanocide synergique du 205 Bayer-309 Fourneau et de quelques composés organiques d'antimoine, sur l'infection expérimentale à *Trypanosoma congolense* de la Souris et du Cobaye. [The Synergic Trypanocidal Action of 205 Bayer-309 Fourneau and some Organic Compounds of Antimony, in experimental Infections of the Mouse and the Guinea Pig with *Trypanosoma congolense*].—*C.R. Soc. Biol. Paris.* **106**. 712-715. [11 refs.]

The authors review earlier work on the drug treatment of trypanosomal infections, including the observations of BERG [Deuts. tierärztl. Wschr. (1925) 33. 361] on Bayer 205 in bovines infected with *Tr. congolense*, and the views of HORNBY [Vet. J. (1919.) 26. 89] on the use of tartar emetic against *Tr. congolense* and *Tr. vivax*. They then offer their own observations upon the synergy between 205 Bayer-309 Fourneau and three organic antimony compounds commonly employed against *Leishmania* and bilharziases:—sodium acetyl-amino-phenyl-stibnate (pentavalent), sodium antimony thioglycollate and antimony trithioglycollamide (trivalent).

Mice and guinea pigs were used as experimental animals and infection was established with *Tr. congolense*. Various quantities of the drugs were administered, by intravenous injection alone and in combination.

The authors reached the conclusions that synergic action is manifested between 309 Fourneau and antimony compounds, in the sense of cleansing the animal of trypanosomal infection and that the co-operation is more pronounced with the trivalent derivatives; *i.e.* sodium antimony thioglycollate and sodium antimony trithioglycollamide. They consider that the preponderant part is played by 309. The combination has no prophylactic effect.

TRAUTWEIN, Karl. (1931). Versuche zur chemotherapeutischen Beeinflussung der experimentellen Maul- und Klaunenseuche. [Chemo-therapeutic Experiments in the Treatment of experimental Foot and Mouth Disease].—Arch. wiss. prakt. Tierhik. 63. 201-214. [16 refs.]

In the course of a search for an agent with a specific disinfectant action on the virus of foot and mouth disease, 95 substances were tested. These comprised dyes of the aniline group, metals (bismuth, mercury, silver, iron, copper and cadmium), arsenical compounds, iodine compounds, drugs containing sulphur, formol preparations, tar derivatives, quinoline derivatives and other chemicals and alkaloids (pilocarpine, acid soaps, animal bases, etc.). While many of them showed specially strong viricidal action *in vitro*, all were devoid of action *in vivo* in these experiments, except derivatives of the quinoline group which, apparently, prevented the generalisation of the disease in guinea pigs. This work has not yet been repeated on farm animals.

ORLOFF, N. P., & KUSCHINA, L. K. (1931). Anwendungsversuche mit Intratrachealinjektionen Jodhaltiger Verbindungen bei der Heilung der Protostrongylidosis (Wurmbronchopneumonie) der Schafe. [Critical Tests of intratracheal Injections of Remedies containing Iodine for the Treatment of verminous Pneumonia in Sheep].—Arch. wiss. prakt. Tierhik. 63. 330-335.

RICAUD & CAMUS. (1931). Sur l'emploi des pyréthrines dans le traitement des bronchites vermineuses des bovidés. [On the Use of Pyrethrines in the Treatment of Verminous Bronchitis in Cattle].—Rev. Path. comp. 31. 720-724. [10 refs.]

These tests were carried out by giving intratracheal injections of various mixtures containing iodine to different groups of sheep. After a period of about three weeks, the sheep were killed and a careful examination of the lungs was carried out in order to find any remaining parasites.

The various mixtures tested in this way were (a) iodine 1 and glycerine 10; (b) iodine 1 and ether 10; (c) iodine 1 and benzine 10 and (d) LUGOL's solution 1, turpentine 1 and olive oil 2. In the principal experiment, the following results were obtained:—from three groups of 25 sheep, which had received mixtures (a), (b) and (c) respectively, an average of 2.5, 4.0 and 6.0 worms per sheep were recovered at *post-mortem* examination. From 15 untreated control sheep of the same original group an average of 10.25 worms per sheep was recovered.

Extensive field trials have confirmed these results and the authors conclude that iodine preparations are valuable as intratracheal injections for the treatment of verminous bronchitis in sheep, the mixture of iodine and benzine being particularly recommended because of its comparative cheapness. Three doses of 2 c.c. each should be given at intervals of 3-4 days.

Ricard and Camus tested an iodine-benzol mixture which had been advocated and found that its effect on the worms varied with the amount of iodine in the mixture and that, in order to be really efficient, it must contain such large amounts of iodine as to be dangerous to the host.

Solutions of pyrethrines were next tried. An extract of pyrethrine flowers dissolved in a mixture

of alcohol and water was found to be of little value, but it gave good results when dissolved in alcohol alone ; athresia of the trachea accompanied by a dangerous degree of dyspnoea followed its use, however, in some instances.

Pyrethrines in oily solution were next tried ; they gave very good results without the bad after-effects associated with the other solutions. One injection suffices, except where broncho-pneumonia has become established ; the injection may have to be repeated two or three times for advanced cases.

—. (1931). **Calcium Therapy.**—*Brit. Med. J.* May 23rd. 898-899.

This is a discussion at a meeting of the Harveian Society on May 14th. HUNTER considered that calcium, as a therapeutic agent, is overrated. The body has large reserves of calcium, especially in the bones, and only in certain conditions, e.g. in *osteitis fibrosa* is the available calcium inadequate.

In hyperparathyroidism, there is a hypercalcæmia and an increased calcium excretion in the urine, the calcium being derived from the bones.

In osteomalacia and rickets, the condition is one of failure of the osteoid tissue to calcify although calcium may be available. Calcium therapy is indicated here, but it is useless in *osteitis fibrosa* as there is hyperactivity of parathyroid gland. He considers that bio-chemistry may be just as helpful as histology in the differential diagnosis of bone diseases. HARE doubted if animal rickets is always due to lack of vitamin D. He had seen some cases of apparent rickets which had the histological appearance of *osteitis fibrosa*, but he had never seen tumours of the parathyroids in animals.

SJOLLEMA, B., SEEKLES, L., & KAAY, F. C. van der. (1931). *Wijziging van de Calcium-Therapie.* [A Modification of Calcium Therapy].—*Tijdschr. Diergeneesk.* 58. 415-417. [2 refs.]

Following their previous experiments on day-old calves and as the result of trials carried out on 24 cases of milk fever, the authors are of the opinion that the addition of magnesium chloride to calcium chloride solution lessens the depressant action of the calcium on the heart.

They used a solution prepared by dissolving 40 g. of calcium chloride and 15 g. of magnesium chloride in 30 c.c. of water. The solution, which was injected intravenously, must be introduced slowly and the authors recommend that its administration should take four minutes. They suggest that two-thirds of the dose of the same solution might be useful in cases of grass-tetany.

KOK, D. J. (1931). *Autohæmotherapie bij Eczema Impetiginosum, Eczema Humida acuta, Eczema Squamocrustosum chronica en Furunculose van Honden.* [Autohæmotherapy in the Treatment of *Eczema Impetiginosum*, *Acute Moist Eczema*, *Chronic Squamous Eczema* and *Furunculosis in Dogs*].—*Tijdschr. Diergeneesk.* 58. 128-139. 1 table. [10 refs.]

The author refers to publications regarding the value of autohæmotherapy and autoserotherapy in the human subject and gives a tabular statement of 49 cases of skin disease in dogs which were kept under observation for a year ; this occupies the greater part of the paper. Altogether, 73 cases were treated, but apparently 24 of them were not kept under observation.

Citrated blood was used and was injected intramuscularly. One to ten doses of 5-10 c.c. each were given in different cases with intervals of four days to three weeks between each dose.

It is claimed that 70 per cent. of the cases were cured, that there was improvement in 15 per cent. and that, in the remaining 15 per cent., there was no improvement.

URBAIN, A., & GUILLOT, G. (1931). *Sur les pyréthrines. Leur emploi en Médecine vétérinaire.* [The Pyrethrines : their Use in Veterinary Medicine].—*Rev. Path. comp.* 31. 493-502. [10 refs.]

Certain pyrethrines obtained from the chrysanthemum plant have long been used as insecticides ; more recently they have been used as skin parasiticides and as anthelmintics in human and veterinary medicine.

They are almost non-toxic for warm blooded animals owing to saponification which takes

place on contact with body tissues, but may be harmful when injected in large doses intravenously into mammals.

Pyrethrines are very poisonous for cold blooded animals by all modes of administration and all the invertebrates except those which have a thick chitinous covering. Insect larvæ and helminths are readily killed by contact with pyrethrines in very high dilutions.

In veterinary practice an alcoholic solution of pyrethrine is serviceable as an external parasiticide and, internally, pyrethrine is efficient in the killing of intestinal worms.

Details of the treatment of horses is fully described and some case records are given.

REVIEW. (1931). **Cod-Liver Oils and Irradiated Preparations.**—*Brit. Med. J.* 853-854. [3 refs.]

A general article discussing the relative values of cod liver oil and irradiated ergosterol, referring in particular to a publication by POULSSON from the Norwegian State Vitamin Research Institute. American work [BARNES, J., BRADY, M. J., & JAMES, E. M. (1930). *Amer. J. Dis. Child.* 29. 45.] indicated the superiority of cod-liver oil over irradiated ergosterol for the cure of rickets in children, when comparison was made upon the basis of equivalent "rat units." Similar superiority was claimed for cod-liver oil by DE SANCTIS and CRAIG [(1930.) *J. Amer. Med. Ass.* 94. 1284.]

The difference is regarded as due to the fact that irradiated ergosterol contains only vitamin D, while cod-liver oil contains vitamin A as well as vitamin D, both of which are liable to be deficient in the diets of children of the poorer classes.

In estimating the antirachitic value of a substance by the "rat unit method" the diet is arranged to reflect only the D factor so that the comparison of irradiated ergosterol and cod-liver oil on that basis is liable to be misleading. The author points out that a further complicating factor in the evaluation of cod-liver oil is the variability between different samples of oil and the confusion in regard to methods of assay. In Britain the method of the Pharmaceutical Society takes one "rat unit" as the antirachitic equivalent of 0.0001 mg. of the standard irradiated cholesterol supplied by the Medical Research Council. In Norway, however, the procedure is such that the "unit" corresponds to less than half the British unit, while in America a unit six times as high as the British unit has been proposed by the Council of Pharmacy. The term "rat unit" therefore means very little unless the method of determination is precisely stated.

In this connection the report of DRUMMOND and HILDITCH [(1930.) *The Relative Values of Cod-liver Oils from various Sources. Empire Marketing Board, London*] should be consulted.

Of special interest to veterinarians is the statement that cod-liver oil for farm use is frequently adulterated; also the suggestion that definite specifications should be adopted for such grades of oil.

VEDEL, P. (1931). Terpentinbehandling av mastitis. [Turpentine Treatment of Mastitis].—*Svensk Vet.-tidskr.* 36. 21-25.

The author gives brief summaries of 16 cases of mastitis of which the respective causes, cocci and *B. pyogenes*, were determined by a bacteriologist. He treated them by subcutaneous (post-scapular) injections of 8 c.c. of pure turpentine together with appropriate udder treatment. He considered that the treatment yielded good results.

#### POISONS AND POISONING.

BARCROFT, J. (1931). **The Toxicity of Atmospheres containing Hydrocyanic Gas.**—*J. Hyg. Camb.* 31. 1-34. 23 figs. 8 tables. [16 refs.]

A lengthy and thorough study from the War Department Experimental Station. In the introduction, the author points out that, although the lethal dose of an ordinary pharmacological preparation is expressible in a simple statement of quantity, the lethal dose of a poisonous gas cannot be so expressed.

During the war, it was the practice among belligerent nations to express the toxicity of gases

by "concentration-time curves," the curve, or the equation to it, being the correct statement of the dose.

In using a large variety of animals upon which to test the toxicity of atmospheres containing hydrocyanic gas, the author proceeds on very broad lines, pointing out that, "if we know the whole range of toxicity curves for the animal creation, there is a high degree of probability that the toxicity to man will be of the same general order."

Section II of the paper discusses the toxicity-concentration curves of different mammals and birds. The curves show the prospects of life of the animals when exposed to atmospheres containing various quantities of HCN; and prospects for goats, monkeys, rabbits, rats, cats, dogs, guinea pigs, mice, fowls, pigeons and canaries are given.

It is interesting to note the enormous differences in species susceptibility. The goat can tolerate twice the concentration which will kill the dog and the guinea pig four times that which will kill the rat.

Section III discusses the mode and seat of action of HCN vapour and it is shown that the acid first stimulates the respiratory centre and then inhibits it; the heart ultimately failing, partly as the result of direct action, but partly on account of the secondary asphyxia. The specific power of the gas to increase the total ventilation of the lungs is an important factor in the specific toxicity of the gas for different animals. With the rabbit, for instance, the respiratory centre is but little stimulated and the total volume of air inhaled per minute is not materially increased by the presence of HCN. With the cat, on the other hand, the rate of lung ventilation, and consequent absorption of HCN, is greatly increased in the initial stages before inhibition of the respiratory centre supervenes.

Section V discusses the toxicity of HCN to man when inhaled. War experience shewed that man is more resistant than some other forms of life (e.g. the dog) and can tolerate 500 parts per million for a minute without injury.

Section VI deals with the time required to produce unconsciousness.

Section VII makes a comparison between mammals and birds. Owing to their high susceptibility, canaries and pigeons are valuable as indicators of lethal concentrations.

Section VIII deals with the concentration necessary to make pigeons vomit.

Section IX, on indicators, points out that there is no simple chemical indicator which can be trusted to reveal (with sufficient rapidity) the presence of the gas in dilutions which fall short of those affecting man. The pigeon forms a useful indicator, vomiting within a few minutes in suspected atmospheres, safe for man for considerable periods, (so long as he is not breathing at an excessive rate).

Section X discusses treatment. Artificial respiration is useful, so long as the "oxidative enzyme mechanism" of the cells of the respiratory centre is not unduly damaged. The injection of glucose and of acetone, tried for various theoretical reasons, produces a certain small degree of resistance to HCN poisoning but is of little practical value in treatment. The fate of the animal after removal from the gas is a "race between the incidental degradation of the machinery of the body and the dissipation or destruction of HCN."

HUPKA & GÖTZE. (1931). Zur Frage der Schädlichkeit des Fluors beim Rinde. [On the Question of the Harmfulness of Fluorine for Cattle].—Deuts. tierärztl. Wschr. 39. 203-204.

[NOTE.—This is a paper given at the 25th "Wissensch. Referierabend" at the Hanover Veterinary High School.]

Hupka gives an account of an illness of cattle pastured to windward of a chemical factory. The disease developed after the cattle had been put on to grassland, increased throughout the summer and only diminished in severity when the herd returned to winter quarters. Symptoms included general loss of condition, lameness, particularly in the fore legs, and sore feet, with the result that the animals spent their time lying down. Large painless swellings developed on the costal arch and similar ones were sometimes present round the pastern joints. The condition was ascribed to osteomalacia.

Grass on the affected land acquired a yellow, frosted appearance and the tree foliage was covered with rust coloured flakes.

Investigation of the matter showed that fluorine from the chemical factory was the cause of the trouble, both in the plants and in the animals.

Götze reports cases of fluorine poisoning originating from a phosphate factory. Cattle were affected by smoke and dust and the disease appeared as an osteodystrophy with gradual loss of flesh and other symptoms similar to those detailed above.

Feeding experiments on cattle with sodium fluoride and sodium fluosilicate produced great disturbance in health. Cattle fed with 3-6 g. of these salts showed acute poisoning with painful digestive disturbance (acute fluorine indigestion). Recovery took place in 8-10 days after the last dose had been given. 2-3 g. administered daily by stomach-tube, so that it went to the rumen, did not cause this acute indigestion, but the animals concerned lost flesh gradually.

This experiment thus showed variations from the natural fluorine poisoning, which Götze considers is due, either to some change which takes place in the fluorine whilst on the grass or to some other factor which is jointly responsible.

In the discussion which followed the paper, LIESCHE referred to the possibility that fluoric acid from chemical factories may become bound up with the water droplets occurring in fog. Such fog would cause respiratory irritation to animals inhaling it. Fluorine deposited on grass has less chance of reaching the respiratory system.

BORNAND, M., & BONIFACI, G. (1931). Cas d'intoxication mortel chez un cheval par ingestion de fluosilicate de sodium. [Case of Fatal Poisoning in a Horse by Sodium Fluosilicate].—Schweiz. Arch. Tierhlk. 73. 237-240. [5 refs.]

The paper opens with a general note on the various preparations in common use for the destruction of vermin. Sodium fluosilicate is dangerous to man and to animals other than rats and mice.

The authors investigated a case of poisoning in a horse which had eaten maize flour mixed with some of this salt. Analysis of the contents of the alimentary tract revealed the cause of death. There was 3.5 g. of sodium fluosilicate to every kg. of stomach contents. The stomach and intestines showed hyperæmic areas with haemorrhagic foci.

The authors suggest that a label indicating that sodium fluosilicate is poisonous to man and domestic animals should always be affixed to the containers.

SCHOOP, G. (1931). Der biologische Nachweis von Arsenvergiftungen. [The Biological Diagnosis of Arsenical Poisoning].—Deuts. tierärztl. Wschr. 39. 244-248. 3 figs. [10 refs.]

This biological method of detecting arsenic is based upon the property possessed by many hyphomycetes of forming strongly-smelling, volatile, arsenical compounds. A pungent garlic-like smell is produced even with as little as 0.000001 g. of arsenious oxide.

Suspected material is mixed with a tube of culture medium inoculated with the hyphomycete chosen for the test and the culture is examined after incubation for 24 hours at 37.5° C. Suitable control cultures are prepared at the same time for purposes of comparison.

SEDDON, H. R., & BELSCHNER, H. G. (1931). Mortalities in Sheep associated with Grazing on Young Pasture Plants, with Special Reference to *Chenopodium atriplicinum*.—Austral. Vet. J. 7. 68-70. [2 refs.]

Since 1925, losses in sheep have occurred each year at the same season in the western herbage country. A plant, *Chenopodium atriplicinum*, which grows in large quantities on this pasture land was suspected of being poisonous. When losses began to occur in 1930, Seddon tested the plant for toxicity and found that illness followed in sheep and guinea pigs if large quantities of the young plant were fed for several days. The full grown plant was not poisonous and the young plant was harmless when fed in small amounts.

In the case of other plants which are more poisonous in the immature than in the mature stage, the toxic principle is hydrocyanic acid, but it was found that this did not apply to *Chenopodium atriplicinum*.

CANE, J. (1931). **Equisetum Poisoning in a Herd of Cattle.**—*Vet. Rec.* **11.** 436-437.

Describes sickness in a herd of hand-fed cattle which lost condition and were affected with diarrhoea. When the ration was examined, one lot of hay was found to contain nearly one-third of horsetails, *Equisetum palustre*. When good hay was substituted, the cattle recovered and the investigation carried out left little reason to doubt that the plant had caused the trouble.

TAPERNOUX, A. (1931). Deux observations toxicologiques curieuses. [Two strange Toxicological Observations].—*Rev. vét. et J. Méd. vét.* **83.** 263-264.

The first case is one of strychnine poisoning in carrier pigeons which fell dead in full flight. They had presumably ingested some vermin killer.

The second case concerns fatal nicotine poisoning in a dog.

In both cases diagnosis was based on chemical analysis of the body organs and of their contents.

#### TECHNIQUE.

FREI, W., & HALL, G. N. (1931). **The Cultivation of Anaërobic Bacteria in Media containing Cystein.**—*Vet. J.* **87.** 259-266. 5 text figs. [17 refs.]

A paper dealing with the cultivation of anaërobies in media adjusted to specific "reduction potential" by the addition of cystein. There are a number of errors in the text which, however, are corrected in the succeeding number of the same journal, [Corrigenda. *Vet. J.* **87.** 346.]

A brief explanation is given concerning the use of reducing agents such as cystein, glutathione, succinic acid, xanthine, or sodium sulphide, which act as "hydrogen donators" and so serve to maintain a "reduction potential" favourable for anaërobic bacterial growth. [An explanation of the terms Eh and rH, used in connection with redox systems, will be found in the abstractor's notes on the paper by KOLLATH, see this *Bulletin*, **1.** p 237.]

The authors use cystein to remove atmospheric oxygen diffusing into solid media, so permitting anaërobic growth on ordinary plates (Esmarch plates 5 cm. diameter). The donator is used in the form of cystein hydrochloride, added to the extent of 0.3 per cent. of the medium (ox heart, beef, or horse meat broth with 1 per cent. peptone and 0.5 per cent. sodium chloride, set with 2.5 per cent. of agar).

The points which the authors emphasise for preparation of the medium are:—(1) complete sterilisation of the medium before adding the cystein hydrochloride; (2) avoidance of overheating the agar, and correct proportion of agar, so that the plates are not so soft as to permit unduly rapid diffusion of oxygen; (3) the addition of thiodiglycollic acid (0.5 per cent.) in cases where the medium shows a tendency to become turbid by crystallisation of cystein.

The main purpose of the authors was to obtain a simple method of obtaining pure cultures of anaërobies, and at the same time to distinguish easily between such organisms as *B. chauvæi* and *B. œdematis maligni*. They find that cystein agar plates, with or without the addition of glucose (1 per cent. to the stock cystein agar) give satisfactory results and avoid the tedious conventional anaërobic technique. The freshly made tubes of cystein agar are melted in a water-bath in the usual way, cooled to 50° C., inoculated by capillary pipette, and poured into Esmarch plates. As soon as the agar has solidified a sterilised coverslip is placed over the centre of the medium and the plate incubated at 37° C. After about 17 hours incubation well-defined colonies appear, especially in the area under the coverslip. These can easily be distinguished under 2/3 magnification and no difficulty was experienced by the authors in differentiating *B. chauvæi*, *B. œdematis maligni*.

(*V. septique*) and *B. histolyticus*, although considerable difficulty was experienced in distinguishing *B.ædematis maligni* from *B. putreficus*, *B. novyi*, and *B. botulinus*.

Five photomicrographs of plate cultures are given to show the characteristics of *B. chauvæi*, *B.ædematis maligni* and *B. histolyticus*, in pure and in mixed culture.

SCHIEL, Otto. (1931). Die Technik der Bronchialschleimentnahme beim Rind. [The Technique of the Withdrawal of Bronchial Mucus in Cattle].—Deuts. tierärztl. Wschr. 39. 49-51. 2 figs.

The author describes in detail the technique to be adopted for the removal of samples of mucus from the lungs of cattle for the diagnosis of pulmonary tuberculosis. This is effected by inserting a small curved trocar into the trachea at the level of the upper third of the neck and by passing through it a wire provided with a terminal sterile swab which collects the mucus from the region of the bronchi.

NIESCHULZ, O. (1931). Een Vliegenvrije Ruimte voor Overbrengingsproeven met Bloedzuigende Insecten. [A Fly-proof Chamber for Transmission Experiments with blood-sucking Insects.]—Tijdschr. Diergeneesk. 58. 142-146. 8 text-figs.

In carrying out experiments with blood-sucking insects, it is of the utmost importance to prevent the escape of the insects as they may spread infection or may even infect the operator. In the case of non-flying transmitting agents, this is simply achieved by placing the legs of the table in vessels containing creolin or some similar fluid.

In the case of flying insects, a certain amount of work can be done with cages covered in gauze, but these have a limited use. The author describes (with figures) a fly-proof chamber which he has devised in connection with his fly-transmission work in Java.

The chamber is covered with galvanised gauze having a mesh of about 2 mm. and comprises a main working room and a kind of small lobby with an outer and an inner door. The main chamber measures about 6 feet in each direction and there is room for two persons to sit at the table which it contains. In working with tropical insects, the table can be warmed by a radiator to about 28 to 30° C.

In the case of diseases transmissible to man, cages with glass tops are used for the insects. These cages have gauze sides and cotton gauze sleeves are fixed in two of the sides. India rubber gloves are used when it is necessary to put the hands into these cages.

#### MISCELLANEOUS.

SEMENSKAJA, E. (1930). Contribution à l'étude des corps de Kurloff. [The Study of Kurloff's Bodies].—C.R. Soc. Biol. Paris. 105. 771-773.

In the course of two years, the author has prepared daily leucocyte curves of some 200 guinea pigs, many of which were under examination from birth.

The Kurloff bodies contained in lymphocytes in guinea pigs are very variable in size, shape and staining reactions.

During the first month of life the bodies are small and are present in insignificant numbers, but between the end of the first and fourth months, there is a considerable rise in the number and this rise coincides with the onset of puberty. In gravid females the rise is only moderate, but the bodies are of large size. Towards the end of pregnancy, there is a fall in number which is followed by a sharp rise after parturition. Castration and ovariotomy cause a fall in the number, but complete disappearance has never been observed.

Defective diets and starvation cause a rapid rise in the number of Kurloff bodies.

KRAUSE, Hellmut. (1931). Ueber Kannibalismus bei Hühnern. [Cannibalism in Fowls].—Deuts. tierärztl. Wschr. 39. 166.

Not only will fowls eat the raw flesh of their own as well as of other species, but they will even kill their companions and eat their viscera. MALKE has ascribed this depraved appetite to a protein deficiency; in many cases this is probably true, but the author describes an instance in which, in the absence of a deficient diet, a number of hens set upon a bird suffering from eversion of the oviduct. He suggests that this cannibalistic attack is the result of a reflex excitation produced by the sight of the swollen and bloody extruded organ.

GRZIMEK, B. (1931). Ein Beitrag zur Anatomie des Haushuhnes. [A Contribution to the Anatomy of the Domestic Fowl].—*Tierärztl. Rdsch.* **37**. 287-290. 7 figs.

A description of seven X-ray photographs of hens taken to demonstrate the exact position of different bones in the skeleton of a live fowl.

LAHAYE, Ch. (1931). L'aviculture dans notre pays. [Poultry Farming in Belgium].—*Ann. Méd. vét.* **76**. 102-121.

Prior to the war, fancy and sporting poultry predominated in Belgium. By the establishment of government-subsidised stations for research in breeding for flesh and egg production, the improvement of indigenous breeds, the delivery of lectures by trained workers, the marking of imported and preserved eggs and the careful control of the standard of exported eggs, Belgium has now obtained a high place in the European markets.

One hundred million eggs were imported in 1914; to-day, 712 million eggs, worth nearly 660 million francs, are exported. The annual value of the industry to the country is estimated at nearly 2,500 million francs or one-fifth of the total value of agricultural products.

SIMMONET, H. (1931). Diagnostic biologique de la gestation. [Biological Diagnosis of Pregnancy].—*Rec. Méd. vét.* **107**. 385-401. [39 refs.]

This is a general review of the question. The gravid uterus is specifically responsive to the secretion of the posterior lobe of the hypophysis and, if an extract of the gland is injected intravenously into a pregnant animal, it causes uterine contractions which are, however, too slight to affect the foetus adversely.

The author suggests that advantage may be taken of this phenomenon for the diagnosis of pregnancy in animals in which the uterus is palpable. He discusses other endocrine phenomena related to pregnancy.

ZAHARESCU-KARAMAN, N., & ROSENTHAL, Zénobie. (1931). A propos du test hormonal de la grossesse. [The Pregnancy Diagnosis Test].—*C.R. Soc. Biol. Paris.* **107**. 397-8.

Using a modification of ZONDEK and ASCHEIM's technique [inoculation of urine into immature female mice] the authors obtained a correct diagnosis with urine samples from 12 pregnant women. A correct diagnosis was also obtained in tests with samples from 13 non-pregnant women.

The maximum reaction of the ovaries of the mice was obtained four days after the first injection of the urine, this effect being associated with the presence of a secretion of the anterior lobe of the pituitary gland. The technique adopted is described.

#### REPORTS.

UGANDA PROTECTORATE. (1931). Annual Report of the Veterinary Department for the Year ended 31st December, 1930. [POULTON, W. F.]. Entebbe: Govt. Printer. 25 pp. 1 map. [fcp.]

STAFF.—The staff is divided into four divisions, administrative (director of Veterinary Services

and deputy director), research (veterinary pathologist and assistant veterinary pathologist), disease control (two senior veterinary officers and 10 veterinary officers) and live stock (senior assistant live stock officer and two assistant live stock officers). There are two Asiatic veterinary assistants and there is a clerical staff.

**DIVISION OF RESEARCH.**—It has been decided that the veterinary department will re-occupy the laboratory at Entebbe as soon as suitable buildings are ready for the Human Trypanosomiasis Institute and for the general research of the medical department. Mr. R. W. M. METTAM, from the Veterinary Research Institute, Kabete, Kenya, was appointed Veterinary Pathologist and Mr. J. CARMICHAEL was appointed Assistant Pathologist.

#### DISEASES OF CATTLE.

**RINDERPEST.**—A detailed account is given of the manner in which the disease has spread since it appeared in the Eastern Province in 1927. During 1929, it spread slowly in a series of jumps in a south-easterly direction. Game, particularly buffalo, eland and pigs, became infected and spread it to neighbouring herds. A map shows the areas in which mass immunisation of the cattle was carried out during 1928, 1929 and 1930. In this way large areas have been created in which the cattle are immune. Advantage was taken of this valuable condition to move threatened susceptible cattle to areas in these parts of the country.

Serum-simultaneous inoculation was continued on a large scale; cattle were moved under supervision and steps were taken to keep the game from coming into contact with them as far as possible. In some areas, lines of pits to trap buffalo have been used to cause these animals to move elsewhere.

An example of the development of the department is given by a comparison of figures which contrast certain details of the severe outbreak of 1919 with the present one. In 1919, the disease progressed 100 miles in six weeks in Ankole; no inoculations were carried out and about 100,000 cattle died from natural infection. In 1930, the disease spread 50 miles in six months; 74,500 cattle were inoculated and about 4,000 died. In 1919 in Masaka, the disease spread 60 miles in four weeks; 3,000 inoculations were carried out and about 120,000 cattle died. In 1930, the disease spread 60 miles in a year; 87,000 inoculations were carried out and about 10,000 cattle died.

Certain small initial outbreaks in threatened areas were entirely stamped out at the beginning. 180,222 adult cattle were inoculated with a mortality of 19,494 and 44,937 calves were inoculated with a mortality of 15,213. 108 outbreaks were eradicated and eight foci, including inoculation camps, remained.

The serum supply used in this work was partly that obtained from the Kabete Veterinary Laboratory, Kenya, and partly from field serum prepared in the inoculation camps. The titre of the field serum which consisted of the bleedings of animals that had recently passed through the immunisation reaction, was about the same as that of the Kabete serum. 6,375 litres of the field serum were prepared. A fee of Shs. 4 for adults and Shs. 2 for calves was charged, with remission of fees for the animals which died at the inoculation camps. Fees were also remitted for the immunisation of the animals which were subsequently bled for serum. Owners soon learnt that the bleeding was harmless and brought their animals willingly.

12,900 litres of the Kabete serum were purchased at a cost of £12,900 and the "field" serum cost £2,300 to prepare, making a total of £15,290 for serum. £15,805 was collected as fees. £16,357 was still outstanding for unpaid fees. £16,872 will thus remain over and above the cost of the serum to go towards the other expenses of the campaign.

A report by ALLAN on experiments with a vaccine is given as an appendix. This is dealt with separately [this *Bulletin*. 1. 214].

**TRYPARASITIASIS.**—Outbreaks of infection with *T. vivax*, *T. congolense* and *T. brucei* alone and mixed were reported. Past experiments carried out by the department have shown that *T. brucei* and *T. vivax* of the *Glossina palpalis* areas are not of serious importance, even to freshly imported pure-bred cattle, provided that the animals are properly housed and fed. This is important because many lake shore areas at present closed on account of past sleeping sickness (*T. gambiense*) infection must inevitably be re-opened on account of pressure due to increasing population.

**CONTAGIOUS BOVINE PLEURO-PNEUMONIA.**—No outbreaks have occurred since 1927, but one chronic lesion was found during 1928 in an animal slaughtered at a native market in the Eastern

Province. This state of affairs was brought about by rigorous quarantine and other measures, including vaccination.

BLACK QUARTER occurred in the Eastern Province. Some inoculations were carried out with vaccine obtained from the Kabete (Kenya) laboratory.

ANTHRAX is commonly encountered in some parts of the protectorate, but it does not usually assume epizootic form.

TUBERCULOSIS.—13 cases were recorded during the year in slaughtered Ankole stock. The disease is probably not rare in these cattle. They are never housed and belong to nomadic peoples.

DISEASES OF OTHER ANIMALS.—There were no epizootics in sheep or goats. Canine piroplasmosis was encountered in all districts. There were several outbreaks of fowl typhoid. A vaccine obtained from the Kabete (Kenya) laboratory gave good results.

FIELD RESEARCH.—Close observation was maintained on the Koja Peninsula on the East Coast Fever situation and tests were carried out on the question of a possible mild infection with *T. parva*. Rinderpest vaccine preparation and tests were carried out.

GLOSSINA INVESTIGATIONS.—During the year, a scheme was drawn up to free the main water supplies of south Ankole from *G. morsitans*. Previous observations had shown that useful results could be expected from this work and the Colonial Development Fund had given a grant to the Director of Veterinary Services for this purpose.

There has been extension of "fly" to the Kafunzu valley, by the impingement of transport, mainly motor cars and lorries. "Smoke houses" are used in two places to check the spread of the "fly" by transport vehicles.

NATIVE EDUCATION.—African veterinary assistants have given good service and it is desirable that facilities for their training in Uganda be developed.

ANIMAL HUSBANDRY.—Severe epizootic disease is a constant menace to animal husbandry. With the development of the veterinary department, there is a gratifying increase in the activities in relation to the improvement in livestock. Owners are more willing to invest capital in stock.

Five (Ayreshire) bulls and 11 heifers, three Romney Marsh-Suffolk cross rams, 10 (Australorp, Barnvelder and Rhode Island Red) cocks and 40 hens were imported during the year and distributed to farms after acclimatisation.

There is now a reasonably accurate computation of the cattle population and of its distribution.

An appendix to the report contains a table showing the cattle carrying capacity of the Protectorate.

Castration of cattle, sheep and goats has been continued and extended.

STOCK FARMS.—There are four stock farms and a fifth is being started. There are 692 cattle, 37 donkeys, 92 goats, 69 sheep, 168 fowls, nine turkeys and seven geese on the farms.

The meat and milk supplies and the trade in hides and skins are discussed.

NIGERIA, NORTHERN PROVINCES. (1931). *Fifth Annual Report of the Veterinary Laboratory, Vom, for the Year ending 31st Dec., 1929.* [HALL, G. Norman.] Ann. Rep. Vet. Dept. for the Year 1929. pp. 47-84. Lagos. Govt. Printer. [5s. 6d.] [fcp.]

BUILDINGS AND SANITATION.—A building programme costing approximately £34,000, which was started in 1927, was at a standstill during the year as the original grant had been overspent. The actual buildings were complete, but the interior fittings were not finished; machinery for gas, electricity and cold storage had arrived, but had not been installed. Two double storied houses and three bungalows have been build for the staff.

STOCK FOR LABORATORY USE.—There is difficulty over the supply of susceptible cattle for use as rinderpest virus producers and this difficulty is likely to increase in the future.

There is a good supply of sheep and goats. Some pigs and small laboratory animals are bred at the laboratory.

FORAGE AND GRAZING.—Fodder supplies are insufficient during the dry season and it is necessary to hand-feed throughout most of the year. Hay, the straw of a threshed millet crop, cotton seed and guinea-corn are obtainable locally.

There are 500 acres of coarse grazing but 120 acres of this area are reserved for the segregation

of the rinderpest susceptible animals obtained for use as virus producers. The soil is of poor quality and requires to be heavily dressed with lime.

ANTI-RINDERPEST SERUM PRODUCTION.—In the course of producing 9,750 litres of serum, 1,067 hyper-immunising, intra-muscular injections were given and there were 5,019 bleedings at an average rate of 11.18 c.c. per kg. per month, yielding 2,290 c.c. per injection. 439 virus producers of an average weight of 133 kg. yielded an average of 5,590 c.c. of virulent blood.

The virulent blood is now introduced intramuscularly into the serum producers. The intraruminal route had been used, but it was discontinued as there was some doubt as to the potency of the serum thus obtained.

BLACK QUARTER VACCINE.—45,650 doses of formolised culture vaccine were prepared. Details of the method of production and of a test are given.

HÆMORRHAGIC SEPTICÆMIA.—Cases have been diagnosed, but the disease is not of great economic importance.

TUBERCULOSIS.—The disease was reported in a pure-bred and half-bred herd in the Cameroons. MANLEY has given an account of this infection (*vide J. Comp. Path. & Therap.* 42. 276-278.)

DEMODECTIC MANGE IN CATTLE.—Examination of the under surface of the hides of cattle which had been used for the production of rinderpest virus has revealed the presence of small, soft, white spots filled with *Demodex folliculorum*. The spots varied in size, the largest being  $\frac{1}{8}$  in. in diameter. They were commonest in the skin of the forelegs from the point of the shoulder to the knee and on the hind legs from the stifle joint to the hock. Nodules were present in 83.6 per cent of 300 hides examined.

Clinical demodectic mange is not common in these cattle and the condition is of little importance.

COCCIDIOSIS.—Coccidiosis is common in the cattle. The extent to which it is the cause of mortality, either directly or indirectly, is unknown. It was seen in goats for the first time during the year.

GOAT DISEASE.—A transmissible pleuro-pneumonia of goats was encountered in some experimental animals. A minute cocco-bacillus was isolated from infective blood during the early stages of the illness, but its aetiological relationship was not established. The disease has not been observed as a naturally contrasted illness of goats.

The research work on rinderpest, contagious bovine pleuro-pneumonia and trypanosomiasis is dealt with separately [this *Bulletin*. 1. 213, 222 & 208.]

BASUTOLAND. (1930). *Annual Report of the Principal Veterinary Officer for the year 1929.* [VERNEY, F. A.] 10 pp. Maseru. [Typewritten Report.]

There had been good winter rains and the spring of 1929, in contrast to that of 1928, was a good one and, all round, it was a much better year for livestock.

The bulk of the report is devoted to the measures taken to deal with sheep "scab" which was very prevalent. There are government dips at various places in the country and it is hoped that, before long, there will be dips at a sufficient number of selected centres to meet the needs of the department; the whole country will then be placed under a uniform "scab" law. Hitherto, however, certain areas have been unprovided for in this respect. There are no dipping tanks in the mountain areas with the consequence that the disease is very prevalent in these parts. A large number of farmers lost their entire crop of lambs from "scab" during the year.

Constant movement of infected sheep gives a lot of trouble to the department.

The sheep in the "clean" areas are subjected to inspection and dipping after lambing and shearing have been completed. 785,164 sheep and goats were inspected and 2,986,021 sheep and goats were dipped during the year.

Apart from the incidence in the horses in mountain areas and in unowned horses which have become wild, there is very little equine mange. In the areas in which there are tanks, the local horses are periodically rounded-up for inspection and dipping.

There are seasonal fluctuations in the number of anthrax outbreaks and inoculation of all transport oxen is compulsory. None of the outbreaks caused serious losses; the anthrax vaccine supplied by the Union Government of South Africa was used and it invariably prevented the incidence of further cases.

Worm infestation is prevalent in sheep. Gallsickness and biliary fever occurred regularly and cases of "strangles" were very frequent during the year.

Emphasis is laid on the need for controlling the manner in which the natives destroy the mountain pastures. Good pastures are ploughed up and eventually the land becomes eroded and useless.

WEBER. (1931). Zehn Jahre staatliches Veterinäruntersuchungsamt in Königsberg i. Pr. [The Decennium of the State Veterinary Research Laboratory at Königsberg in Prussia].—*Berl. tierärztl. Wschr.* 47. 233-236 & 250-252.

A report on the work of the State Veterinary Research Laboratory, Königsberg, for the decade ending 1930. The technical staff consists of three veterinarians.

Much of the work consists of routine diagnosis, chiefly in relation to such conditions as anthrax, tuberculosis, Johne's disease, glanders, bovine haemorrhagic septicæmia, fowl cholera, human *abortus* fever, malignant oedema, swine fever, rabies, equine infectious anaemia, the recognition of horse flesh in prepared meat products, the examination of milk and milk products, the examination of certain feeding stuffs, such as fish meal, forage, etc., work in connection with worm infestations, notably fascioliasis and the examination of samples of equine faeces for parasitic ova.

### REVIEW.

MAREK, J., & WELLMANN, O. (1931). Die Rhachitis in ihren ätiologischen, biochemischen, pathogenetischen, pathologisch-anatomischen und klinischen Beziehungen: Pathologischer Teil. [The Etiological, Bio-chemical, Pathogenic, Pathological-Anatomical and Clinical Relationships of Rickets]. By Dr. Joseph Marek [Professor of Special Pathology and Therapy. Royal Hungarian Veterinary College, Budapest.] pp. viii + 362. With 171 text figures (7 coloured). Jena: Gustav Fischer. [RM 22, or 24 bound.] [8vo.]

This volume represents only half the complete work; the remainder, which deals chiefly with the bio-chemical aspect of the question, has been undertaken by Wellmann. He also arranged all the experimental diets and made chemical analyses of the bodies of the test animals, while Marek undertook the survey of the literature, the conduct of all the investigations and the compilation of the present volume.

The subject matter is dealt with in six sections:—

(1) a study of natural cases; (2) experimental rickets (chiefly in pigs); (3) a comparison between human and animal rickets; (4) the etiology of rickets in the light of recent research; (5) the prophylaxis and (6) the treatment of rickets.

A very interesting feature of the work is Marek's observation that a deficiency of vitamin D is not followed by the occurrence of rickets in young animals provided that the calcium and phosphorus intake is sufficient and well balanced. Rickets occurs, however, if these minerals are deficient or unbalanced, especially if there is an excess of phosphorus. Marek considers that his so-called EA factor [EA-Erdalkali Alkalizität,  $\text{CaO} + \text{MgO} - \text{P}_2\text{O}_5$ ] is of great importance. [The South African workers do not subscribe to this view and are also at variance with Marek on other points.]

Prophylactically, ultra-violet irradiation of animals or of their food was found to be valuable and preparations containing vitamin D were also considered useful.

It is concluded that a condition of genuine rickets does occur in animals; but that it corresponds to the human delayed rickets and not to the infantile type. In the fourth section of the work, bone diseases in general are discussed and are compared at some length as regards pathogenesis and pathology.

The distinguished author has condensed an enormous amount of information into this work and everyone concerned with bone diseases should consult it.

A good bibliography containing 322 references is given, though one or two important omissions are noted; and a good index is provided. The printing and illustrations, which include photographs of macroscopic and microscopic preparations and X-ray pictures, are excellently carried out.

